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1: AY207429. *Homo sapiens* inte...[gi:27501935]

Links

LOCUS AY207429 9803 bp DNA linear PRI 05-JAN-2003
 DEFINITION *Homo sapiens* interleukin 11 (IL11) gene, complete cds.
 ACCESSION AY207429
 VERSION AY207429.1 GI:27501935
 KEYWORDS .
 SOURCE *Homo sapiens* (human)
 ORGANISM *Homo sapiens*
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata;
Euteleostomi;
Mammalia; Eutheria; Primates; Catarrhini; Hominidae; Homo.
 REFERENCE 1 (bases 1 to 9803)
 AUTHORS Rieder, M.J., Carrington, D.P., da Ponte, S.H., Hastings, N.C.,
 Ahearn, M.O., Kuldane, S.A., Rajkumar, N., Toth, E.J., Yi, Q. and
 Nickerson, D.A.
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 Program for Genomic Applications, UW-FHCRC, Seattle, WA (URL:
<http://pga.gs.washington.edu/>).
 FEATURES Location/Qualifiers
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/db_xref="taxon:9606"
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/replace="t"
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/rpt_type=dispersed
variation 357
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/replace="c"
variation 447
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/replace="c"

FIGURE 1

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CDS           join(1645..1651,3014..3186,3386..3472,3584..3745,
  5778..5948)
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  /product="interleukin 11"
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  /db_xref="GI:27501936"

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FIGURE 1

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variation 4802
/gene="IL11"
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repeat region 5003..5113
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repeat region 5116..5426
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/gene="IL11"
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variation 5157
/gene="IL11"
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/replace="a"
variation 5199
/gene="IL11"
/frequency="0.03"
/replace="c"
variation 5288
/gene="IL11"
/frequency="0.41"
/replace="c"
variation 5970
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/frequency="0.01"
/replace="t"
variation 6068
/gene="IL11"
/frequency="0.01"
/replace="a"
variation 6077
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/replace="t"
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FIGURE 1

variation 6092
/gene="IL11"
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variation 6448
/gene="IL11"
/frequency="0.10"
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variation 6591
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/rpt_type=dispersed
variation 6656
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/frequency="0.05"
/replace="g"
variation 6669
/gene="IL11"
/frequency="0.18"
/replace="g"
repeat region 6984..7169
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/rpt_type=dispersed
variation 7083
/gene="IL11"
/frequency="0.17"
/replace="a"
variation 7161
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/replace="a"
repeat region 7170..7298
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/rpt_type=dispersed
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/frequency="0.33"
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repeat region 7299..7523
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/rpt_type=dispersed

FIGURE 1

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	/rpt_type=dispersed
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	/rpt_type=dispersed
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	/replace="c"
<u>variation</u>	8288
	/frequency="0.07"
	/replace="a"
<u>variation</u>	8337
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<u>variation</u>	8703
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	/replace="t"
<u>variation</u>	8790
	/frequency="0.01"
	/replace="t"
<u>variation</u>	9153
	/frequency="0.02"
	/replace="a"
<u>variation</u>	9596
	/frequency="0.03"
	/replace="t"
<u>variation</u>	9670
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	/frequency="0.31"
	/replace="g"

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SEQ ID NO: 73:

BASE COUNT 2004 a 3117 c 2797 g 1885 t

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181 ctgaacctg ggaggcggag gttacagtga gctgagatca caccactgca ccccaagctg
241 ggtgacacag cgagactctg tctcaaaaaa accaaaaacg aggccaggca cggtagctca
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FIGURE 1

3241 gaggagtctg cgggacgcca cttggagggg ttctgggctc tcaggtggca gagtgaggga
3301 ggggaagagt tggggcctg gcgtggggga tggagggagc cccgaggctg gcagggggcc
3361 acctcacagc tttttccct gccagagggg caaattccca gctgacgggg accacaacct
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FIGURE 1

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9301 gcttgggtt gcttgcacat ttgttgcatt
9361 gctctgtgtt gaccaagggtgc cgcatt
9421 gtcactgttgc cttcccttc
9481 cgtccatgac ctctgttgc
9541 cttggccctg gacggccctg
9601 catcaacccctg
9661 cttcaggagc
9721 gtccttgc
9781 cgaccaagag
ccaaagtctt
agg

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FIGURE 1

Complete native human IL-11 -SEQ ID NO:1- :
 1 11 21 31 41 51
 1 MNCVCRIVLV VLSLWPDATV APGPPPGPPR VSPDPRAEILD STVLLTRSLI ADTRQLAAQL 60
 61 RDKEPADGDH NLDLSLPTLAM SAGALGALQL PGVLTRLRAD LLSYLRHVQW LRRAGCSSLK 120
 121 TLEPELGTLO ARLDRLRRL QLIMSRILALP QPPPDPAPP LAPSSAWGG IRAAHAILGG 180
 181 LHLLDWA VR GLLLKTRL

Complete native macaque IL-11 (Macaca fascicularis) -SEQ ID NO:2- :
 1 11 21 31 41 51
 1 MNCVCRIVLV VLSLWPDATV APGPPPGSPR ASPDPRAEILD STVLLTRSLI EDTRQLTIQL 60
 61 RDKEPADGDH NLDLSLPTLAM SAGALGALQL PSVLTRLRAD LLSYLRHVQW LRRAMGSSLK 120
 121 TLEPELGTLO TRLDRLRRL QLIMSRILALP QLPPDPAPP LAPSSTWGG IRAAHAILGG 180
 181 LHLLDWA VR GLLLKTRL

Complete native mouse IL-11 (Mus musculus) -SEQ ID NO:3- :
 1 11 21 31 41 51
 1 MNCVCRIVLV VLSLWPDVVV APGPPAGSPR VSSDPRADLD SAVLLTRSLI ADTRQLAAQM 60
 61 RDKEPADGDH SLDLSLPTLAM SA GTLGSQL PGVLTRLRVD LMSYLRHVQW LRRAGPSLK 120
 121 TLEPELGTLO ARLERLRLRRL QLIMSRILALP QAAPDQPVIP LGPPASAWGS IRAAHAILGG 180
 181 LHLLDWA VR GLLLKTRL

Complete native rat IL-11 (Rattus norvegicus) -SEQ ID NO:4- :
 1 11 21 31 41 51
 1 MNCVCRIVLV VLSLWPDVVV APGPPAGSPR VSSDPRADLD SAVLLTRSLI ADTRQLAAQM 60
 61 RDKEPADGDH NLDLSLPTLAM SA GTLGSQL PGVLTRLRVD LMSYFRHVQW LRRAGPSLK 120
 121 TLEPELGTLO ARLERLRLRRL QLIMSRILALP QAAPDQPVIP LGPPASAWGS IRAAHAILGG 180
 181 LHLLDWA VR GLLLKTRL

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Native human IL-11 deleted from the 34 first aminoacids -SEQ ID NO :5-:

PRAELD STVLLTRSLL ADTRQLAAQL RDKFPADGDH NLDSLPTLAM
SAGALGALQL PGVLTRLRAD LLSYLRHVQW LRRAAGGSSLK TLEPELGTQ
ARLDRLRLRL QLLMSRLALP QPPPDPAPP LAPPSSAWGG IRAAHAILGG
LHHTLDWAVR GLLLLKTRL

Native macaque IL-11 deleted from the 34 first aminoacids -SEQ ID NO:6- :

PRAELD STVLLTRSLL EDTRQLTIQL KDKFPADGDH NLDSLPTLAM
SAGALGALQL PSVLTRLRAD LLSYLRHVQW LRRAAGGSSLK TLEPELGTQ
TRLDRLLRLRL QLLMSRLALP QLPPDPAPP LAPPSTWGG IRAAHAILGG
LHHTLDWAVR GLLLLKTRL

Native mouse IL-11 deleted from the 34 first aminoacids -SEQ ID NO:7- :

PRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH SLDSLPTLAM
SAGTLGSQL PGVLTRLRVD LMSYLRHVQW LRRAAGPSLK TLEPELGAQ
ARLERLLRLRL QLLMSRLALP QAAPDQPVIP LGPPASAWGS IRAAHAILGG
LHHTLDWAVR GLLLLKTRL

Native rat IL-11 deleted from the 34 first aminoacids -SEQ ID NO:8- :

PRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH NLDSLPTLAM
SAGTLGSQL PGVLTRLRVD LMSYFRHVQW LRRAAGPSLK TLEPELGAQ
ARLERLLRLRL QLLMSRLALP QAAPDQPAVP LGPPASAWGS IRAAHAILGG
LHHTLDWAVR GLLLLKTRL

FIGURE 3

hIL-11 mutein deriving from 34aa-deleted native human hIL-11 -SEQ ID NO :9:-

PRAELDSTVLLTRSLLADTRQLAAQLRDKFPADGDHNLDLPTLAMSAGALGA
 LQLPGVLTRLRADLLSYLRHVQWLRRAGGSSLKTLPELGTIQLARLDRLRRRL
 QLLMSRLALPQPPPDPPAPPLAPPSSAWGGIRAAHAILGGLX₁LTX₂WAVRGLLL
 LKTRL wherein X₁ and X₂ are chosen from the group comprising :

- Alanine (A),
- Valine (V),
- Leucine (L),
- Isoleucine (I),
- Phenylalanine (F),
- Methionine (M),
- Proline (P),
- Tryptophan (W).

hIL-11 mutein deriving from 34aa-deleted native human hIL-11 -SEQ ID NO :10:-

PRAELDSTVLLTRSLLADTRQLAAQLRDKFPADGDHNLDLPTLAMSAGALGA
 LQLPGVLTRLRADLLSYLRHVQWLRRAGGSSLKTLPELGTIQLARLDRLRRRL
 QLLMSRLALPQPPPDPPAPPLAPPSSAWGGIRAAHAILGGLYTLAWAVRGLLL
 LKTRL

hIL-11 mutein deriving from 34aa-deleted native human hIL-11 -SEQ ID NO :11:-

PRAELDSTVLLTRSLLADTRQLAAQLRDKFPADGDHNLDLPTLAMSAGALGA
 LQLPGVLTRLRADLLSYLRHVQWLRRAGGSSLKTLPELGTIQLARLDRLRRRL
 QLLMSRLALPQPPPDPPAPPLAPPSSAWGGIRAAHAILGGLALTLYWAVRGLLL
 LKTRL

hIL-11 mutein deriving from 34aa-deleted native human hIL-11 -SEQ ID NO :12:-

PRAELDSTVLLTRSLLADTRQLAAQLRDKFPADGDHNLDLPTLAMSAGALGA
 LQLPGVLTRLRADLLSYLRHVQWLRRAGGSSLKTLPELGTIQLARLDRLRRRL
 QLLMSRLALPQPPPDPPAPPLAPPSSAWGGIRAAHAILGGLVLTLVWAVRGLLL
 LKTRL

hIL-11 mutein deriving from 34aa-deleted native human hIL-11 -SEQ ID NO :13:-

PRAELDSTVLLTRSLLADTRQLAAQLRDKFPADGDHNLDLPTLAMSAGALGA
 LQLPGVLTRLRADLLSYLRHVQWLRRAGGSSLKTLPELGTIQLARLDRLRRRL
 QLLMSRLALPQPPPDPPAPPLAPPSSAWGGIRAAHAILGGLALTLYWAVRGLLL
 LKTRL

FIGURE 4

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hIL-11 mutein deriving from 21aa-deleted native human hIL-11 -SEQ ID NO :14-:

PGPPPGPPRVSPDPRAELDSTVLLTRSLLADTRQLAAQLRDKFPADGDHNLDL
 PTLAMSAGALGALQLPGVLTRLRADLLSYLRHVQWLRRAGGSSLKTLEPELGT
 LQARLDRLRRRLQLLMSRLALPQPPPDPAPPSSAWGGIRAAHAILGGL**X₁**
LTLX₂WAVRGLLLLKTRL

wherein X₁ and X₂ are chosen from the group comprising :

- Alanine (A),
- Valine (V),
- Leucine (L),
- Isoleucine (I),
- Phenylalanine (F),
- Methionine (M),
- Proline (P),
- Tryptophan (W).

hIL-11 mutein deriving from 21aa-deleted native human hIL-11 -SEQ ID NO :15-:

PGPPPGPPRVSPDPRAELDSTVLLTRSLLADTRQLAAQLRDKFPADGDHNLDL
 PTLAMSAGALGALQLPGVLTRLRADLLSYLRHVQWLRRAGGSSLKTLEPELGT
 LQARLDRLRRRLQLLMSRLALPQPPPDPAPPSSAWGGIRAAHAILGG**L**
TLAWAVRGLLLLKTRL

hIL-11 mutein deriving from 21aa-deleted native human hIL-11 -SEQ ID NO :16-:

PGPPPGPPRVSPDPRAELDSTVLLTRSLLADTRQLAAQLRDKFPADGDHNLDL
 PTLAMSAGALGALQLPGVLTRLRADLLSYLRHVQWLRRAGGSSLKTLEPELGT
 LQARLDRLRRRLQLLMSRLALPQPPPDPAPPSSAWGGIRAAHAILGG**L**
TLVWAVRGLLLLKTRL

hIL-11 mutein deriving from 21aa-deleted native human hIL-11 -SEQ ID NO :17-:

PGPPPGPPRVSPDPRAELDSTVLLTRSLLADTRQLAAQLRDKFPADGDHNLDL
 PTLAMSAGALGALQLPGVLTRLRADLLSYLRHVQWLRRAGGSSLKTLEPELGT
 LQARLDRLRRRLQLLMSRLALPQPPPDPAPPSSAWGGIRAAHAILGG**L**
TLVWAVRGLLLLKTRL

hIL-11 mutein deriving from 21aa-deleted native human hIL-11 -SEQ ID NO :18-:

PGPPPGPPRVSPDPRAELDSTVLLTRSLLADTRQLAAQLRDKFPADGDHNLDL
 PTLAMSAGALGALQLPGVLTRLRADLLSYLRHVQWLRRAGGSSLKTLEPELGT
 LQARLDRLRRRLQLLMSRLALPQPPPDPAPPSSAWGGIRAAHAILGG**L**
TLAWAVRGLLLLKTRL

FIGURE 5

hIL-11 mutein deriving from complete native human hIL-11 -SEQ ID NO :19-:

MNCVCR₁L₂V₃V₄LSLWPDTAVAPG₅PPP₆G₇PPR₈VSPD₉PRAEL₁₀D₁₁STV₁₂L₁₃TRS₁₄LLAD₁₅TR₁₆
QLAAQLR₁₇D₁₈K₁₉F₂₀ADG₂₁D₂₂H₂₃N₂₄L₂₅D₂₆S₂₇L₂₈P₂₉T₃₀L₃₁A₃₂M₃₃S₃₄A₃₅G₃₆A₃₇L₃₈Q₃₉L₄₀P₄₁G₄₂V₄₃L₄₄T₄₅R₄₆L₄₇A₄₈D₄₉L₅₀S₅₁Y₅₂L₅₃R₅₄H₅₅
VQWL₅₆R₅₇A₅₈G₅₉G₆₀S₆₁L₆₂K₆₃T₆₄L₆₅E₆₆P₆₇E₆₈G₆₉T₇₀L₇₁Q₇₂A₇₃R₇₄L₇₅D₇₆R₇₇L₇₈R₇₉R₈₀L₈₁Q₈₂L₈₃M₈₄S₈₅R₈₆L₈₇A₈₈P₈₉Q₉₀P₉₁P₉₂D₉₃P₉₄P₉₅A₉₆P₉₇PL₉₈
APPSSA₉₉W₁₀₀G₁₀₁G₁₀₂I₁₀₃R₁₀₄A₁₀₅H₁₀₆I₁₀₇L₁₀₈G₁₀₉G₁₁₀L₁₁₁X₁₁₁₂L₁₁₃T₁₁₄L₁₁₅X₂₁₁₆W₁₁₇A₁₁₈V₁₁₉R₁₂₀G₁₂₁L₁₂₂L₁₂₃L₁₂₄K₁₂₅T₁₂₆R₁₂₇L₁₂₈

wherein X₁ and X₂ are chosen from the group comprising :

- Alanine (A),
- Valine (V),
- Leucine (L),
- Isoleucine (I),
- Phenylalanine (F),
- Methionine (M),
- Proline (P),
- Tryptophan (W).

hIL-11 mutein deriving from complete native human hIL-11 -SEQ ID NO :20-:

MNCVCR₁L₂V₃V₄LSLWPDTAVAPG₅PPP₆G₇PPR₈VSPD₉PRAEL₁₀D₁₁STV₁₂L₁₃TRS₁₄LLAD₁₅TR₁₆
QLAAQLR₁₇D₁₈K₁₉F₂₀ADG₂₁D₂₂H₂₃N₂₄L₂₅D₂₆S₂₇L₂₈P₂₉T₃₀L₃₁A₃₂M₃₃S₃₄A₃₅G₃₆A₃₇L₃₈Q₃₉L₄₀P₄₁G₄₂V₄₃L₄₄T₄₅R₄₆L₄₇A₄₈D₄₉L₅₀S₅₁Y₅₂L₅₃R₅₄H₅₅
VQWL₅₆R₅₇A₅₈G₅₉G₆₀S₆₁L₆₂K₆₃T₆₄L₆₅E₆₆P₆₇E₆₈G₆₉T₇₀L₇₁Q₇₂A₇₃R₇₄L₇₅D₇₆R₇₇L₇₈R₇₉R₈₀L₈₁Q₈₂L₈₃M₈₄S₈₅R₈₆L₈₇A₈₈P₈₉Q₉₀P₉₁P₉₂D₉₃P₉₄P₉₅A₉₆P₉₇PL₉₈
APPSSA₉₉W₁₀₀G₁₀₁G₁₀₂I₁₀₃R₁₀₄A₁₀₅H₁₀₆I₁₀₇L₁₀₈G₁₀₉G₁₁₀L₁₁₁V₁₁₂L₁₁₃T₁₁₄L₁₁₅W₁₁₆A₁₁₇V₁₁₈R₁₁₉G₁₂₀L₁₂₁L₁₂₂K₁₂₃T₁₂₄R₁₂₅L₁₂₆

hIL-11 mutein deriving from complete native human hIL-11 -SEQ ID NO :21-:

MNCVCR₁L₂V₃V₄LSLWPDTAVAPG₅PPP₆G₇PPR₈VSPD₉PRAEL₁₀D₁₁STV₁₂L₁₃TRS₁₄LLAD₁₅TR₁₆
QLAAQLR₁₇D₁₈K₁₉F₂₀ADG₂₁D₂₂H₂₃N₂₄L₂₅D₂₆S₂₇L₂₈P₂₉T₃₀L₃₁A₃₂M₃₃S₃₄A₃₅G₃₆A₃₇L₃₈Q₃₉L₄₀P₄₁G₄₂V₄₃L₄₄T₄₅R₄₆L₄₇A₄₈D₄₉L₅₀S₅₁Y₅₂L₅₃R₅₄H₅₅
VQWL₅₆R₅₇A₅₈G₅₉G₆₀S₆₁L₆₂K₆₃T₆₄L₆₅E₆₆P₆₇E₆₈G₆₉T₇₀L₇₁Q₇₂A₇₃R₇₄L₇₅D₇₆R₇₇L₇₈R₇₉R₈₀L₈₁Q₈₂L₈₃M₈₄S₈₅R₈₆L₈₇A₈₈P₈₉Q₉₀P₉₁P₉₂D₉₃P₉₄P₉₅A₉₆P₉₇PL₉₈
APPSSA₉₉W₁₀₀G₁₀₁G₁₀₂I₁₀₃R₁₀₄A₁₀₅H₁₀₆I₁₀₇L₁₀₈G₁₀₉G₁₁₀L₁₁₁A₁₁₂T₁₁₃L₁₁₄W₁₁₅A₁₁₆V₁₁₇R₁₁₈G₁₁₉L₁₂₀L₁₂₁K₁₂₂T₁₂₃R₁₂₄L₁₂₅

hIL-11 mutein deriving from complete native human hIL-11 -SEQ ID NO :22-:

MNCVCR₁L₂V₃V₄LSLWPDTAVAPG₅PPP₆G₇PPR₈VSPD₉PRAEL₁₀D₁₁STV₁₂L₁₃TRS₁₄LLAD₁₅TR₁₆
QLAAQLR₁₇D₁₈K₁₉F₂₀ADG₂₁D₂₂H₂₃N₂₄L₂₅D₂₆S₂₇L₂₈P₂₉T₃₀L₃₁A₃₂M₃₃S₃₄A₃₅G₃₆A₃₇L₃₈Q₃₉L₄₀P₄₁G₄₂V₄₃L₄₄T₄₅R₄₆L₄₇A₄₈D₄₉L₅₀S₅₁Y₅₂L₅₃R₅₄H₅₅
VQWL₅₆R₅₇A₅₈G₅₉G₆₀S₆₁L₆₂K₆₃T₆₄L₆₅E₆₆P₆₇E₆₈G₆₉T₇₀L₇₁Q₇₂A₇₃R₇₄L₇₅D₇₆R₇₇L₇₈R₇₉R₈₀L₈₁Q₈₂L₈₃M₈₄S₈₅R₈₆L₈₇A₈₈P₈₉Q₉₀P₉₁P₉₂D₉₃P₉₄P₉₅A₉₆P₉₇PL₉₈
APPSSA₉₉W₁₀₀G₁₀₁G₁₀₂I₁₀₃R₁₀₄A₁₀₅H₁₀₆I₁₀₇L₁₀₈G₁₀₉G₁₁₀L₁₁₁A₁₁₂T₁₁₃L₁₁₄V₁₁₅W₁₁₆A₁₁₇V₁₁₈R₁₁₉G₁₂₀L₁₂₁L₁₂₂K₁₂₃T₁₂₄R₁₂₅L₁₂₆

hIL-11 mutein deriving from complete native human hIL-11 -SEQ ID NO :23-:

MNCVCR₁L₂V₃V₄LSLWPDTAVAPG₅PPP₆G₇PPR₈VSPD₉PRAEL₁₀D₁₁STV₁₂L₁₃TRS₁₄LLAD₁₅TR₁₆
QLAAQLR₁₇D₁₈K₁₉F₂₀ADG₂₁D₂₂H₂₃N₂₄L₂₅D₂₆S₂₇L₂₈P₂₉T₃₀L₃₁A₃₂M₃₃S₃₄A₃₅G₃₆A₃₇L₃₈Q₃₉L₄₀P₄₁G₄₂V₄₃L₄₄T₄₅R₄₆L₄₇A₄₈D₄₉L₅₀S₅₁Y₅₂L₅₃R₅₄H₅₅
VQWL₅₆R₅₇A₅₈G₅₉G₆₀S₆₁L₆₂K₆₃T₆₄L₆₅E₆₆P₆₇E₆₈G₆₉T₇₀L₇₁Q₇₂A₇₃R₇₄L₇₅D₇₆R₇₇L₇₈R₇₉R₈₀L₈₁Q₈₂L₈₃M₈₄S₈₅R₈₆L₈₇A₈₈P₈₉Q₉₀P₉₁P₉₂D₉₃P₉₄P₉₅A₉₆P₉₇PL₉₈
APPSSA₉₉W₁₀₀G₁₀₁G₁₀₂I₁₀₃R₁₀₄A₁₀₅H₁₀₆I₁₀₇L₁₀₈G₁₀₉G₁₁₀L₁₁₁A₁₁₂T₁₁₃L₁₁₄V₁₁₅L₁₁₆W₁₁₇A₁₁₈V₁₁₉R₁₂₀G₁₂₁L₁₂₂L₁₂₃K₁₂₄T₁₂₅R₁₂₆L₁₂₇

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IL-11 mutein deriving from 34aa-deleted native macaque IL-11 -SEQ ID NO:24- :

PRAELD STVLLTRSLL EDTRQLTIQL KDKFPADGDH NLDSLPTLAM
 SAGALGALQL PSVLTRLRAD LLSYLRHVQW LRRAMGSSLK TLEPELGTIQLQ
 TRLDRLRLRRRL QLLMSRLALP QLPPDPPAPP LAPPSSTWGG
 IRAAHAILGG LX₁LTX₂WAVR GLLLLKTRL

wherein X₁ and X₂ are chosen from the group comprising :

- Alanine (A),
- Valine (V),
- Leucine (L),
- Isoleucine (I),
- Phenylalanine (F),
- Methionine (M),
- Proline (P),
- Tryptophan (W).

IL-11 mutein deriving from 34aa-deleted native macaque IL-11 -SEQ ID NO:25- :

PRAELD STVLLTRSLL EDTRQLTIQL KDKFPADGDH NLDSLPTLAM
 SAGALGALQL PSVLTRLRAD LLSYLRHVQW LRRAMGSSLK TLEPELGTIQLQ
 TRLDRLRLRRRL QLLMSRLALP QLPPDPPAPP LAPPSSTWGG
 IRAAHAILGG LYLTLAWAVR GLLLLKTRL

IL-11 mutein deriving from 34aa-deleted native macaque IL-11 -SEQ ID NO:26- :

PRAELD STVLLTRSLL EDTRQLTIQL KDKFPADGDH NLDSLPTLAM
 SAGALGALQL PSVLTRLRAD LLSYLRHVQW LRRAMGSSLK TLEPELGTIQLQ
 TRLDRLRLRRRL QLLMSRLALP QLPPDPPAPP LAPPSSTWGG
 IRAAHAILGG LALTLYWAVR GLLLLKTRL

IL-11 mutein deriving from 34aa-deleted native macaque IL-11 -SEQ ID NO:27- :

PRAELD STVLLTRSLL EDTRQLTIQL KDKFPADGDH NLDSLPTLAM
 SAGALGALQL PSVLTRLRAD LLSYLRHVQW LRRAMGSSLK TLEPELGTIQLQ
 TRLDRLRLRRRL QLLMSRLALP QLPPDPPAPP LAPPSSTWGG
 IRAAHAILGG LYLTLYWAVR GLLLLKTRL

IL-11 mutein deriving from 34aa-deleted native macaque IL-11 -SEQ ID NO:28- :

PRAELD STVLLTRSLL EDTRQLTIQL KDKFPADGDH NLDSLPTLAM
 SAGALGALQL PSVLTRLRAD LLSYLRHVQW LRRAMGSSLK TLEPELGTIQLQ
 TRLDRLRLRRRL QLLMSRLALP QLPPDPPAPP LAPPSSTWGG
 IRAAHAILGG LALTLYWAVR GLLLLKTRL

FIGURE 7

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IL-11 mutein deriving from 21aa-deleted native macaque IL-11 -SEQ ID NO:29- :

PGPPPGSPR ASPDPRAELD STVLLTRSLL EDTRQLTIQL KDKFPADGDH
 NLDSDLPTLAM SAGALGALQL PSVLTRLRAD LLSYLRHVQW LRRAMGSSLK
 TLEPELGTQ TRLDRLRLRRL QLLMSRLALP QLPPDPPAPP
 LAPPSSTWGG IRAAHAILGG LX₁LTX₂WAVR GLLLKTRL

wherein X₁ and X₂ are chosen from the group comprising :

- Alanine (A),
- Valine (V),
- Leucine (L),
- Isoleucine (I),
- Phenylalanine (F),
- Methionine (M),
- Proline (P),
- Tryptophan (W).

IL-11 mutein deriving from 21aa-deleted native macaque IL-11 -SEQ ID NO:30- :

PGPPPGSPR ASPDPRAELD STVLLTRSLL EDTRQLTIQL KDKFPADGDH
 NLDSDLPTLAM SAGALGALQL PSVLTRLRAD LLSYLRHVQW LRRAMGSSLK
 TLEPELGTQ TRLDRLRLRRL QLLMSRLALP QLPPDPPAPP
 LAPPSSTWGG IRAAHAILGG LYLTLWAVR GLLLKTRL

IL-11 mutein deriving from 21aa-deleted native macaque IL-11 -SEQ ID NO:31- :

PGPPPGSPR ASPDPRAELD STVLLTRSLL EDTRQLTIQL KDKFPADGDH
 NLDSDLPTLAM SAGALGALQL PSVLTRLRAD LLSYLRHVQW LRRAMGSSLK
 TLEPELGTQ TRLDRLRLRRL QLLMSRLALP QLPPDPPAPP
 LAPPSSTWGG IRAAHAILGG LALTLWAVR GLLLKTRL

IL-11 mutein deriving from 21aa-deleted native macaque IL-11 -SEQ ID NO:32- :

PGPPPGSPR ASPDPRAELD STVLLTRSLL EDTRQLTIQL KDKFPADGDH
 NLDSDLPTLAM SAGALGALQL PSVLTRLRAD LLSYLRHVQW LRRAMGSSLK
 TLEPELGTQ TRLDRLRLRRL QLLMSRLALP QLPPDPPAPP
 LAPPSSTWGG IRAAHAILGG LYLTLWAVR GLLLKTRL

IL-11 mutein deriving from 21aa-deleted native macaque IL-11 -SEQ ID NO:33- :

PGPPPGSPR ASPDPRAELD STVLLTRSLL EDTRQLTIQL KDKFPADGDH
 NLDSDLPTLAM SAGALGALQL PSVLTRLRAD LLSYLRHVQW LRRAMGSSLK
 TLEPELGTQ TRLDRLRLRRL QLLMSRLALP QLPPDPPAPP
 LAPPSSTWGG IRAAHAILGG LALTLWAVR GLLLKTRL

FIGURE 8

IL-11 mutein deriving from complete native macaque IL-11 -SEQ ID NO:34- :

MNCVRLVLV VSLWPDTAV APGPPPGSPR ASPDPRAELD STVLLTRSLL
 EDTRQLTIQL KDKFPADGDH NLDSLPTLAM SAGALGALQL PSVLTRLRAD
 LLSYLRHVQW LRRAMGSSLK TLEPELGTQ TRLDRLRRRL QLLMSRLALP
 QLPPDPPAPP LAPPSSTWGG IRAAHAILGG ~~LX₁LTX₂~~WAVR
 GLLLLKTRL

wherein X₁ and X₂ are chosen from the group comprising :

- Alanine (A),
- Valine (V),
- Leucine (L),
- Isoleucine (I),
- Phenylalanine (F),
- Methionine (M),
- Proline (P),
- Tryptophan (W).

IL-11 mutein deriving from complete native macaque IL-11 -SEQ ID NO:35- :

MNCVRLVLV VSLWPDTAV APGPPPGSPR ASPDPRAELD STVLLTRSLL
 EDTRQLTIQL KDKFPADGDH NLDSLPTLAM SAGALGALQL PSVLTRLRAD
 LLSYLRHVQW LRRAMGSSLK TLEPELGTQ TRLDRLRRRL QLLMSRLALP
 QLPPDPPAPP LAPPSSTWGG IRAAHAILGG LVLTLAWAVR GLLLLKTRL

IL-11 mutein deriving from complete native macaque IL-11 -SEQ ID NO:36- :

MNCVRLVLV VSLWPDTAV APGPPPGSPR ASPDPRAELD STVLLTRSLL
 EDTRQLTIQL KDKFPADGDH NLDSLPTLAM SAGALGALQL PSVLTRLRAD
 LLSYLRHVQW LRRAMGSSLK TLEPELGTQ TRLDRLRRRL QLLMSRLALP
 QLPPDPPAPP LAPPSSTWGG IRAAHAILGG LATLVWAVR GLLLLKTRL

IL-11 mutein deriving from complete native macaque IL-11 -SEQ ID NO:37- :

MNCVRLVLV VSLWPDTAV APGPPPGSPR ASPDPRAELD STVLLTRSLL
 EDTRQLTIQL KDKFPADGDH NLDSLPTLAM SAGALGALQL PSVLTRLRAD
 LLSYLRHVQW LRRAMGSSLK TLEPELGTQ TRLDRLRRRL QLLMSRLALP
 QLPPDPPAPP LAPPSSTWGG IRAAHAILGG LVLTVWAVR GLLLLKTRL

IL-11 mutein deriving from complete native macaque IL-11 -SEQ ID NO:38- :

MNCVRLVLV VSLWPDTAV APGPPPGSPR ASPDPRAELD STVLLTRSLL
 EDTRQLTIQL KDKFPADGDH NLDSLPTLAM SAGALGALQL PSVLTRLRAD
 LLSYLRHVQW LRRAMGSSLK TLEPELGTQ TRLDRLRRRL QLLMSRLALP
 QLPPDPPAPP LAPPSSTWGG IRAAHAILGG LATLAWAVR GLLLLKTRL

FIGURE 9

IL-11 mutein deriving from 34aa-deleted native mouse IL-11 -SEQ ID NO:39- :

PRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH SLDSLPTLAM
 SAGTLGSQLQ PGVLTRLRVD LMSYLRHVQW LRRAGGPSLK TLEPELGALQ
 ARLERLLRRL QLLMSRLALP QAAPDQPVIP LGPPASAWGS IRAAHAILGG
 LX₁LTX₂WAVR GLLLLKTRL

wherein X₁ and X₂ are chosen from the group comprising :

- Alanine (A),
- Valine (V),
- Leucine (L),
- Isoleucine (I),
- Phenylalanine (F),
- Methionine (M),
- Proline (P),
- Tryptophan (W).

IL-11 mutein deriving from 34aa-deleted native mouse IL-11 -SEQ ID NO:40- :

PRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH SLDSLPTLAM
 SAGTLGSQLQ PGVLTRLRVD LMSYLRHVQW LRRAGGPSLK TLEPELGALQ
 ARLERLLRRL QLLMSRLALP QAAPDQPVIP LGPPASAWGS IRAAHAILGG
 LVITLA₂WAVR GLLLLKTRL

IL-11 mutein deriving from 34aa-deleted native mouse IL-11 -SEQ ID NO:41- :

PRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH SLDSLPTLAM
 SAGTLGSQLQ PGVLTRLRVD LMSYLRHVQW LRRAGGPSLK TLEPELGALQ
 ARLERLLRRL QLLMSRLALP QAAPDQPVIP LGPPASAWGS IRAAHAILGG
 LALTLYWAVR GLLLLKTRL

IL-11 mutein deriving from 34aa-deleted native mouse IL-11 -SEQ ID NO:42- :

PRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH SLDSLPTLAM
 SAGTLGSQLQ PGVLTRLRVD LMSYLRHVQW LRRAGGPSLK TLEPELGALQ
 ARLERLLRRL QLLMSRLALP QAAPDQPVIP LGPPASAWGS IRAAHAILGG
 LVLTLYWAVR GLLLLKTRL

IL-11 mutein deriving from 34aa-deleted native mouse IL-11 -SEQ ID NO:43- :

PRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH SLDSLPTLAM
 SAGTLGSQLQ PGVLTRLRVD LMSYLRHVQW LRRAGGPSLK TLEPELGALQ
 ARLERLLRRL QLLMSRLALP QAAPDQPVIP LGPPASAWGS IRAAHAILGG
 LALTIAWAVR GLLLLKTRL

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IL-11 mutein deriving from 21aa-deleted native mouse IL-11 -SEQ ID NO:44- :

PGPPAGSPR VSSDPRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH
 SLDSLPTLAM SAGTLGSQLQ PGVLTRLRVD LMSYLRHVQW LRRAGGPSLK
 TLEPELGALQ ARLERLLRRL QLLMSRLALP QAAPDQPVIP LGPPASAWGS
 IRAAHAILGG LX₁LTX₂WAVR GLLLLKTRL

wherein X₁ and X₂ are chosen from the group comprising :

- Alanine (A),
- Valine (V),
- Leucine (L),
- Isoleucine (I),
- Phenylalanine (F),
- Methionine (M),
- Proline (P),
- Tryptophan (W).

IL-11 mutein deriving from 21aa-deleted native mouse IL-11 -SEQ ID NO:45- :

PGPPAGSPR VSSDPRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH
 SLDSLPTLAM SAGTLGSQLQ PGVLTRLRVD LMSYLRHVQW LRRAGGPSLK
 TLEPELGALQ ARLERLLRRL QLLMSRLALP QAAPDQPVIP LGPPASAWGS
 IRAAHAILGG LVLTLAWAVR GLLLLKTRL

IL-11 mutein deriving from 21aa-deleted native mouse IL-11 -SEQ ID NO:46- :

PGPPAGSPR VSSDPRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH
 SLDSLPTLAM SAGTLGSQLQ PGVLTRLRVD LMSYLRHVQW LRRAGGPSLK
 TLEPELGALQ ARLERLLRRL QLLMSRLALP QAAPDQPVIP LGPPASAWGS
 IRAAHAILGG LALTLYWAVR GLLLLKTRL

IL-11 mutein deriving from 21aa-deleted native mouse IL-11 -SEQ ID NO:47- :

PGPPAGSPR VSSDPRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH
 SLDSLPTLAM SAGTLGSQLQ PGVLTRLRVD LMSYLRHVQW LRRAGGPSLK
 TLEPELGALQ ARLERLLRRL QLLMSRLALP QAAPDQPVIP LGPPASAWGS
 IRAAHAILGG LVLTLVWAVR GLLLLKTRL

IL-11 mutein deriving from 21aa-deleted native mouse IL-11 -SEQ ID NO:48- :

PGPPAGSPR VSSDPRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH
 SLDSLPTLAM SAGTLGSQLQ PGVLTRLRVD LMSYLRHVQW LRRAGGPSLK
 TLEPELGALQ ARLERLLRRL QLLMSRLALP QAAPDQPVIP LGPPASAWGS
 IRAAHAILGG LALTLLAWAVR GLLLLKTRL

FIGURE 11

IL-11 mutein deriving from complete native mouse IL-11 -SEQ ID NO:49- :

MNCVCR₁LV₂ V₃SLWPDRVV APGPPAGSPR VSSDPRADLD SAVLLTR₁SLL
 ADTRQLAAQM RDKFPADGDH SLDSLPTLAM SAGTLGSQLQ PGVLTRLRVD
 LMSYLRHVQW LRRAGGPSLK TLEPELGALQ ARLERLLRRL QLLMSRLALP
 QAAPDQPVIP LGPPASAWGS IRAAHAILGG LX₁LTX₂WAVR
 GLLLLKTRL

wherein X₁ and X₂ are chosen from the group comprising :

- Alanine (A),
- Valine (V),
- Leucine (L),
- Isoleucine (I),
- Phenylalanine (F),
- Methionine (M),
- Proline (P),
- Tryptophan (W).

IL-11 mutein deriving from complete native mouse IL-11 -SEQ ID NO:50- :

MNCVCR₁LV₂ V₃SLWPDRVV APGPPAGSPR VSSDPRADLD SAVLLTR₁SLL
 ADTRQLAAQM RDKFPADGDH SLDSLPTLAM SAGTLGSQLQ PGVLTRLRVD
 LMSYLRHVQW LRRAGGPSLK TLEPELGALQ ARLERLLRRL QLLMSRLALP
 QAAPDQPVIP LGPPASAWGS IRAAHAILGG LVLTLWAVR GLLLLKTRL

IL-11 mutein deriving from complete native mouse IL-11 -SEQ ID NO:51- :

MNCVCR₁LV₂ V₃SLWPDRVV APGPPAGSPR VSSDPRADLD SAVLLTR₁SLL
 ADTRQLAAQM RDKFPADGDH SLDSLPTLAM SAGTLGSQLQ PGVLTRLRVD
 LMSYLRHVQW LRRAGGPSLK TLEPELGALQ ARLERLLRRL QLLMSRLALP
 QAAPDQPVIP LGPPASAWGS IRAAHAILGG LALTLYWAVR GLLLLKTRL

IL-11 mutein deriving from complete native mouse IL-11 -SEQ ID NO:52- :

MNCVCR₁LV₂ V₃SLWPDRVV APGPPAGSPR VSSDPRADLD SAVLLTR₁SLL
 ADTRQLAAQM RDKFPADGDH SLDSLPTLAM SAGTLGSQLQ PGVLTRLRVD
 LMSYLRHVQW LRRAGGPSLK TLEPELGALQ ARLERLLRRL QLLMSRLALP
 QAAPDQPVIP LGPPASAWGS IRAAHAILGG LVLTLWAVR GLLLLKTRL

IL-11 mutein deriving from complete native mouse IL-11 -SEQ ID NO:53- :

MNCVCR₁LV₂ V₃SLWPDRVV APGPPAGSPR VSSDPRADLD SAVLLTR₁SLL
 ADTRQLAAQM RDKFPADGDH SLDSLPTLAM SAGTLGSQLQ PGVLTRLRVD
 LMSYLRHVQW LRRAGGPSLK TLEPELGALQ ARLERLLRRL QLLMSRLALP
 QAAPDQPVIP LGPPASAWGS IRAAHAILGG LALTLWAVR GLLLLKTRL

IL-11 mutein deriving from 34aa-deleted native rat IL-11 -SEQ ID NO:54- :

PRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH NLDSLPTLAM
 SAGTLGSQLQ PGVLTRLRVD LMSYFRHVQW LRRAAGPSLK TLEPELGALQ
 ARLERLLRRL QLLMSRLALP QAAPDQPAVP LGPPASAWGS IRAAHAILGG
LX₁LTX₂WAVR GLLLLKTRL

wherein X₁ and X₂ are chosen from the group comprising :

- Alanine (A),
- Valine (V),
- Leucine (L),
- Isoleucine (I),
- Phenylalanine (F),
- Methionine (M),
- Proline (P),
- Tryptophan (W).

IL-11 mutein deriving from 34aa-deleted native rat IL-11 -SEQ ID NO:55- :

PRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH NLDSLPTLAM
 SAGTLGSQLQ PGVLTRLRVD LMSYFRHVQW LRRAAGPSLK TLEPELGALQ
 ARLERLLRRL QLLMSRLALP QAAPDQPAVP LGPPASAWGS IRAAHAILGG
LVLTLAWAVR GLLLLKTRL

IL-11 mutein deriving from 34aa-deleted native rat IL-11 -SEQ ID NO:56- :

PRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH NLDSLPTLAM
 SAGTLGSQLQ PGVLTRLRVD LMSYFRHVQW LRRAAGPSLK TLEPELGALQ
 ARLERLLRRL QLLMSRLALP QAAPDQPAVP LGPPASAWGS IRAAHAILGG
LALTLYWAVR GLLLLKTRL

IL-11 mutein deriving from 34aa-deleted native rat IL-11 -SEQ ID NO:57- :

PRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH NLDSLPTLAM
 SAGTLGSQLQ PGVLTRLRVD LMSYFRHVQW LRRAAGPSLK TLEPELGALQ
 ARLERLLRRL QLLMSRLALP QAAPDQPAVP LGPPASAWGS IRAAHAILGG
LVLTLWAVR GLLLLKTRL

IL-11 mutein deriving from 34aa-deleted native rat IL-11 -SEQ ID NO:58- :

PRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH NLDSLPTLAM
 SAGTLGSQLQ PGVLTRLRVD LMSYFRHVQW LRRAAGPSLK TLEPELGALQ
 ARLERLLRRL QLLMSRLALP QAAPDQPAVP LGPPASAWGS IRAAHAILGG
LALTLAWAVR GLLLLKTRL

FIGURE 13

IL-11 mutein deriving from 21aa-deleted native rat IL-11 -SEQ ID NO:59- :

PGPPAGSPR VSSDPRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH
 NLDLPLTLAM SAGTLGSQLQ PGVLTRLRVD LMSYFRHVQW LRRAAGPSLK
 TLEPELGALQ ARLERLLRRL QLLMSRLALP QAAPDQPAVP LGPPASAWGS
 IRAAHAILGG LX₁LTX₂WAVR GLLLKTRL

wherein X₁ and X₂ are chosen from the group comprising :

- Alanine (A),
- Valine (V),
- Leucine (L),
- Isoleucine (I),
- Phenylalanine (F),
- Methionine (M),
- Proline (P),
- Tryptophan (W).

IL-11 mutein deriving from 21aa-deleted native rat IL-11 -SEQ ID NO:60- :

PGPPAGSPR VSSDPRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH
 NLDLPLTLAM SAGTLGSQLQ PGVLTRLRVD LMSYFRHVQW LRRAAGPSLK
 TLEPELGALQ ARLERLLRRL QLLMSRLALP QAAPDQPAVP LGPPASAWGS
 IRAAHAILGG LYLTLWAVR GLLLKTRL

IL-11 mutein deriving from 21aa-deleted native rat IL-11 -SEQ ID NO:61- :

PGPPAGSPR VSSDPRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH
 NLDLPLTLAM SAGTLGSQLQ PGVLTRLRVD LMSYFRHVQW LRRAAGPSLK
 TLEPELGALQ ARLERLLRRL QLLMSRLALP QAAPDQPAVP LGPPASAWGS
 IRAAHAILGG LALTLYWAVR GLLLKTRL

IL-11 mutein deriving from 21aa-deleted native rat IL-11 -SEQ ID NO:62- :

PGPPAGSPR VSSDPRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH
 NLDLPLTLAM SAGTLGSQLQ PGVLTRLRVD LMSYFRHVQW LRRAAGPSLK
 TLEPELGALQ ARLERLLRRL QLLMSRLALP QAAPDQPAVP LGPPASAWGS
 IRAAHAILGG LYLTLWAVR GLLLKTRL

IL-11 mutein deriving from 21aa-deleted native rat IL-11 -SEQ ID NO:63- :

PGPPAGSPR VSSDPRADLD SAVLLTRSLL ADTRQLAAQM RDKFPADGDH
 NLDLPLTLAM SAGTLGSQLQ PGVLTRLRVD LMSYFRHVQW LRRAAGPSLK
 TLEPELGALQ ARLERLLRRL QLLMSRLALP QAAPDQPAVP LGPPASAWGS
 IRAAHAILGG LALTLYWAVR GLLLKTRL

IL-11 mutein deriving from complete native rat IL-11 -SEQ ID NO:64- :

MNCVCR₁LV₂ VSLWPDRVV APGPPAGSPR VSSDPRADLD SAVLLTR₃SLL
 ADTRQLAAQM RDKFPADGDH NLDSLPTLAM SAGTLGSQL PGVLTRLRVD
 LMSYFRHVQW LRRAAGPSLK TLEPELGALQ ARLERLLRRL QLLMSRLALP
 QAAPDQPAVP LGPPASAWGS IRAAHAILGG X₁X₂WAVR GLLLKTRL
 wherein X₁ and X₂ are chosen from the group comprising :

- Alanine (A),
- Valine (V),
- Leucine (L),
- Isoleucine (I),
- Phenylalanine (F),
- Methionine (M),
- Proline (P),
- Tryptophan (W).

IL-11 mutein deriving from complete native rat IL-11 -SEQ ID NO:65- :

MNCVCR₁LV₂ VSLWPDRVV APGPPAGSPR VSSDPRADLD SAVLLTR₃SLL
 ADTRQLAAQM RDKFPADGDH NLDSLPTLAM SAGTLGSQL PGVLTRLRVD
 LMSYFRHVQW LRRAAGPSLK TLEPELGALQ ARLERLLRRL QLLMSRLALP
 QAAPDQPAVP LGPPASAWGS IRAAHAILGG LVLTLAWAVR GLLLKTRL

IL-11 mutein deriving from complete native rat IL-11 -SEQ ID NO:66- :

MNCVCR₁LV₂ VSLWPDRVV APGPPAGSPR VSSDPRADLD SAVLLTR₃SLL
 ADTRQLAAQM RDKFPADGDH NLDSLPTLAM SAGTLGSQL PGVLTRLRVD
 LMSYFRHVQW LRRAAGPSLK TLEPELGALQ ARLERLLRRL QLLMSRLALP
 QAAPDQPAVP LGPPASAWGS IRAAHAILGG LALTLWAVR GLLLKTRL

IL-11 mutein deriving from complete native rat IL-11 -SEQ ID NO:67- :

MNCVCR₁LV₂ VSLWPDRVV APGPPAGSPR VSSDPRADLD SAVLLTR₃SLL
 ADTRQLAAQM RDKFPADGDH NLDSLPTLAM SAGTLGSQL PGVLTRLRVD
 LMSYFRHVQW LRRAAGPSLK TLEPELGALQ ARLERLLRRL QLLMSRLALP
 QAAPDQPAVP LGPPASAWGS IRAAHAILGG LYLTLWAVR GLLLKTRL

IL-11 mutein deriving from complete native rat IL-11 -SEQ ID NO:68- :

MNCVCR₁LV₂ VSLWPDRVV APGPPAGSPR VSSDPRADLD SAVLLTR₃SLL
 ADTRQLAAQM RDKFPADGDH NLDSLPTLAM SAGTLGSQL PGVLTRLRVD
 LMSYFRHVQW LRRAAGPSLK TLEPELGALQ ARLERLLRRL QLLMSRLALP
 QAAPDQPAVP LGPPASAWGS IRAAHAILGG LALTLAWAVR GLLLKTRL

Joined CDS for human complete native IL-11 -SEQ ID NO:69-:

atg aac tgt gtt tgc cgc ctg gtc ctg gtc gtg ctg agc ctg tgg cca gat aca gct gtc gcc cct ggg cca cca
 cct ggc ccc cct cga gtt tcc cca gac cct cgg gcc gag ctg gac agc acc gtg ctc ctg acc cgc tct ctc
 ctg gcg gac acg cgg cag ctg gct gca cag ctg agg gac aaa ttc cca gct gac ggg gac cac aac ctg gat
 tcc ctg ccc acc ctg gcc atg agt gcg ggg gca ctg gga gct cta cag ctc cca ggt gtg ctg aca agg
 ctg cga gcg gac cta ctg tcc tac ctg cgg cac gtg cag tgg ctg cgc cgg gca ggt ggc tct tcc ctg aag
 acc ctg gag ccc gag ctg ggc acc ctg cag gcc cga ctg gac cgg ctg ctg cgc cgg ctg cag ctc ctg atg
 tcc cgc ctg gcc ctg ccc cag cca ccc ccc gac ccc ccc ccc ccc ccc ccc ccc ccc ccc tcc tca gcc tgg
 ggg ggc atc agg gcc gcc cac gcc atc ctg ggg ggg ctg cac ctg aca ctt gac tgg gcc gtg agg gga
 ctg ctg ctg aag act cgg ctg tga

**Joined CDS for the IL-11 mutein which derives from the 34aa-deleted human IL-11 –
SEQ ID NO:70-:**

cct cgg gcc gag ctg gac agc acc gtg ctc ctg acc cgc tct ctc ctg gcg gac acg cgg cag ctg gct gca
 cag ctg agg gac aaa ttc cca gct gac ggg gac cac aac ctg gat tcc ctg ccc acc ctg gcc atg agt gcg
 ggg gca ctg gga gct cta cag ctc cca ggt gtg ctg aca agg ctg cga gcg gac cta ctg tcc tac ctg cgg
 cac gtg cag tgg ctg cgc cgg gca ggt ggc tct tcc ctg aag acc ctg gag ccc gag ctg ggc acc ctg cag
 gcc cga ctg gac cgg ctg ctg cgc cgg ctg cag ctc ctg atg tcc cgc ctg gcc ctg ccc cag cca ccc ccc
 gac ccc ccc ccc ccc ccc ccc tcc tca gcc tgg ggg ggc atc agg gcc gcc cac gcc atc
 ctg ggg ggg ctg n₁n₂n₃ ctg aca ctt n₄n₅n₆ tgg gcc gtg agg gga ctg ctg ctg aag act cgg ctg
 tga

wherein the codon n₁n₂n₃ and the codon n₄n₅n₆ are both chosen among the group comprising the nucleotide codons which codes for a hydrophobic aminoacid, namely for Alanine (A), Valine (V), Leucine (L), Isoleucine (I), Phenylalanine (F), Methionine (M), Proline (P), Tryptophan (W).

n₁n₂n₃ and n₄n₅n₆ can be chosen among the group comprising the following nucleotide codons:

- GCT, GCC, GCA, GCG
- GTT, GTC, GTA, GTG,
- TTA, TTG, CTT, CTC, CTA, CTG,
- ATT, ATC, ATA,
- TTT, TTC,
- ATG,
- CCT, CCC, CCA, CCG,
- TGG.

FIGURE 16A

Joined CDS for the IL-11 mutein which derives from the 21aa-deleted human IL-11 – SEQ ID NO:71:-

cct ggg cca cca cct ggc ccc cct cga gtt tcc cca gac cct cgg gcc gag ctg gac agc acc gtg ctc ctg acc cgc tct ctc ctg gcg gac acg cgg cag ctg gct gca cag ctg agg gac aaa ttc cca gct gac ggg gac cac aac ctg gat tcc ctg ccc acc ctg gcc atg agt gcg ggg gca ctg gga gct cta cag ctc cca ggt gtg ctg aca agg ctg cga gcg gac cta ctg tcc tac ctg cgg cac gtg cag tgg ctg cgc cgg gca ggt ggc tct tcc ctg aag acc ctg gag ccc gag ctg ggc acc ctg cag gcc cga ctg gac cgg ctg cgc cgg ctg cag ctc ctg atg tcc cgc ctg gcc ctg ccc cag cca ccc ccc gac ccc tcc tca gcc tgg ggg ggc atc agg gcc cac gcc atc ctg ggg ggg ctg n₁n₂n₃ ctg aca ctt n₄n₅n₆ tgg gcc gtg agg gga ctg ctg ctg aag act cgg ctg tga

wherein the codon n₁n₂n₃ and the codon n₄n₅n₆ are as defined in Figure 16A.

Joined CDS for the IL-11 mutein which derives from the complete human IL-11 –SEQ ID NO:72:-

atg aac tgt gtt tgc cgc ctg gtc ctg gtc gtg ctg agc ctg tgg cca gat aca gtc gtc gcc cct ggg cca cca cct ggc ccc cct cga gtt tcc cca gac cct cgg gcc gag ctg gac agc acc gtg ctc ctg acc cgc tct ctc ctg gcg gac acg cgg cag ctg gct gca cag ctg agg gac aaa ttc cca gct gac ggg gac cac aac ctg gat tcc ctg ccc acc ctg gcc atg agt gcg ggg gca ctg gga gct cta cag ctc cca ggt gtg ctg aca agg ctg cga gcg gac cta ctg tcc tac ctg cgg cac gtg cag tgg ctg cgc cgg gca ggt ggc tct tcc ctg aag acc ctg gag ccc gag ctg ggc acc ctg cag gcc cga ctg gac cgg ctg ctg cgc cgg ctg cag ctc ctg atg tcc cgc ctg gcc ctg ccc cag cca ccc ccc gac ccc ccc ccc ccc ccc ccc ccc ccc tcc tca gcc tgg ggg ggc atc agg gcc cac gcc atc ctg ggg ggg ctg n₁n₂n₃ ctg aca ctt n₄n₅n₆ tgg gcc gtg agg gga ctg ctg ctg aag act cgg ctg tga

wherein the codon n₁n₂n₃ and the codon n₄n₅n₆ are as defined in Figure 16A.

Mutated AY207429 nucleic acid -SEQ ID NO:74-

FIGURE 17

FIGURE 17

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6601 tttttgagat ggagtotcgc tctgttgccct aggctggagt gcagtgaggg aatctaaggt
 6661 cactgcaacc tccacccccc gggttcaagc aattctccctg cctcagccctc ccgatttagct
 6721 gggatcacag gtgtgcacca ccatgcccag ctaattattt atttctttt tatttttagt
 6781 agagacaggg tttcaccatg ttggccaggc tggtttcgaa ctccgtaccc caggtatcc
 6841 tcctgcctcg gcctcccaaa gtgtctggat tacagggtgt agccaccaca cctgaccat
 6901 aggtcttcaa taaatattt atggaaggtt ccacaagtca cctgtgatc aacagtaccc
 6961 gtatggaca aagctgcaag gtcagatgg ttcttattgg ctgtgttccat ctagacaac
 7021 tggaaacaat ctagatattcc aacagtgggg gtaagcaac atgggtcattc tgtggataga
 7081 acgccaccca gcccgggca gcaggactg tcattcagg aggtcaagga gagagcttg
 7141 ctggggatat agaaaagatat cctgacattt gccaggcatg gtggctcagc cctgtatcc
 7201 tggcaactttt ggaggacgaa gcgagtggtt cactgaatgc caagatgtt agacccggct
 7261 gcgagacatg gcaaaaaaccct gtcctaaaaa agaaagaatg atgtcctgac atgaaacagc
 7321 aggtacacaaa accactgcat gtcgtgatcc caattttgtt ttttctttt tatatatgga
 7381 ttaaaacaaa aatcctaaag gggaaatacgc caaaatgtt acaaatactg tctccaggc
 7441 aaaggagaga ggtgggattt tgggtgactt ttaatgttta tgattgtctg tattttacag
 7501 aatttctgcc atgactgtt attttgcattt acacattttt aaaaataataa acactatttt
 7561 tagaataaca gaatatcgc ctccctctt ccaaaaataa gcccctcagg ggggacaaag
 7621 ttgaccgctg attgaggctg tcaggcgtt gcaactaagtg tgggctttt acttacacaa
 7681 tcctccttggc ctcttgcata cggccctgtt tacaggcgg gggaaactgag tctcagacaa
 7741 ggagtggggc ctctgttgc caaagtccaca cagctaggaa gaggtggaaag tgggattctg
 7801 cgcgcgttctt ggcctttcc caaagctctc tttgcaagtc ggtgttgagg aatccctcgcc
 7861 acatgcacac acatgagata tggagaaaca ggttcagtaa ggattttggg cttacccagg
 7921 gcctagagaa gggtcaatgg cagagtaggg atgataattt aatgcttta gttactttt
 7981 cctttacaat aaccaggaca gacttccagg gggccctgtt cgtaactagt ttgagtctgg
 8041 ggttggaggt gcccattctg gggccggagt tttgatttccat ccatcatagc cctcaagact
 8101 ccaggctggc tggcggcggt ggctcacgc tctaattccca gcaacttggg aggctgaggc
 8161 gggtggatca ttggaggcata gggttcaag gcccggctg ccaacatgg aaaaacccctg
 8221 ctctactaaa aatacaatcc agtacttcgg aaggctgagg caggagaatc gtcgaaccc
 8281 aggagacggg ggttgcggtg acccgagatc acatcacaaa cagccctagg cagtgcgggg
 8341 ccccaggcga ggctcagacc tggctccaca gagctgtctg ggtgtatcgat ctcctccgt
 8401 ggaggcaggg tttgagccctc ccctgggggc cccggactgc taaggctt ttttgcg
 8461 atggagtctc gtcctgttgc ctggcttgc gtcagtgatc gcaatctaag ctcactgcct
 8521 gggcaacaag agtgaattt catctcaaaa aacaaaaaaac aaacaaacaa aaaaaaaact
 8581 ccaggctgtt tccctggagg agaaggggagc ccacagtccc cggagagttt ctggaaagagg
 8641 cccctgtgtt tccgatgagg tccaaagcc ctcaccatgg aggctcttccccc cccggccccc
 8701 tgctgtccac cctggcaggc ccattggcggg gggccggatc tccctccatc gggcatctcc
 8761 acgctctgtt acgctgatc ccaggccccc gtgaagcccc acgggtcaag gtcgtgggc
 8821 cggggctggg aggctgtcac gcttgggtt tgggtccctt aaccaggatc catccaccac
 8881 agccaccatg atctggctt gaaacaggag gtgccttgc cgcgttccagg gcacccggaa
 8941 gtgggtccctt gttctgggg agtgcaaaaa gaccctccatgg aaggccggatc acctggccct
 9001 ccgtccgtt cccatgttgc agatgttactt ttttgcggatc tccatggatcc agtgcgggg
 9061 ggctgaggg gacaggggg aaccaaggcc cccctgttgc gggatcttgc agagggaaacg
 9121 ggatgttgc gtcactgtt gggggacatc caggaggag gtcaggatc tggctgttgc
 9181 agaaggatg gtcctccatgg ccctctccatgg ggtggccatc ggtgaccat caagggggcc
 9241 cagtgttgcgtt gatcacaga accaaccggc tggccatggg cttggccggcc tccctggcc
 9301 gcctgggtt gcctgacatc ttgttgcgtt gccaggccgc cggaggacagg gactgtcc
 9361 gcctcgatc gaccaggatc cgcattccccc aacccttcgg cccggccccc cacccttcc
 9421 gtcctagac ctcccttc tccctccatgg gatgttccccc ctggacatc tccacccct
 9481 cgtccatgac ctctctgcctt ggccctgaa gtcggccctg gtcctggggcc gccaggacta
 9541 cctggccctg gacgcccctg acaacggatg gggcttccctt tccactgtt gggccctt
 9601 catcaacactt cttcaggagc cggctccac ctggacccccc aggaccacgc gcacggccccc
 9661 cctggatatg cgcctggccca aagcgccatc ctccacatgg cacctgcagg tggatccca
 9721 gtcctcacaga ccaggccatg gcaaggccccc ggaaccctcc ggcaggatcc agagggggact
 9781 cgaccaagag cccaaatgtt agg

//

wherein the codon n_1, n_2, n_3 and the codon n_4, n_5, n_6 are as defined in Figure 16A.

FIGURE 17

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mRNA of IL-11 mutein deriving from human IL-11 -SEQ ID NO:75:-

gaa ggg uua aag gcc ccc ggc ucc cug ccc ccu gcc cug ggg aac ccc ugg ccc ugu ggg gac aug aac ugu guu ugc cgc cug guc cug gug cug agc cug ugg cca gau aca gcu guc gcc ccu ggg cca cca ccu ggc ccc ccu cga guu ucc cca gac ccu cgg gcc gag cug gac acc gug cuc acc cgc ucu cuc cug gcg gac acg cgg cag cug gcu gca cag cug agg gac aaa uuc cca gcu gac ggg gac cac aac cug gau ucc cug ccc acc cug gcc aug agu gcg ggg gca cug gga gcu cua cag cuc cca ggu gug cug aca agg cug cga gcg gac cua cug ucc uac cug cgg cac gug cag ugg cug cgc cgg gca ggu ggc ucu ucc cug aag acc cug gag ccc gag cug ggc acc cug cag gcc cga cug gac cgg cug cug cgc cgg cug cag cuc cug aug ucc cgc cug gcc cug ccc cag cca ccc ccg gac ccg ccg gcg ccc ccg cug gcg ccc ccc ucc uca gcc ugg ggg ggc auc agg gcc cac gcc auc cug ggg ggg cug n1n2n3 cug aca cuu n4n5n6 ugg gcc gug agg gga cug cug cug cug aag acu egg cug uga ccc ggg gcc caa agc cac cac cgu ccu ucc aaa gcc aga ucu uau uua uuu uau uuc agu acu ggg ggc gaa aca gcc agg uga ucc ccc cgc cau uau cuc ccc cua guu aga gac agu ccu ucc gug agg ccu ggg ggg cau cug ugc cuu uuu uau acu uau uua uuu cag gag cag ggg ugg gag gca ggu gga cug cug ggu ccc cga gga ggg gac ugg ggu ccc gga uuc uug ggu cuc caa gaa guc ugu cca cag acu ucu gcc cug gcu cuu ccc cau cua ggc cug ggc agg aac aua uau uua uuu aag caa uua cuu uuc aug uug ggg ugg gga cgg agg gga aag gga agc cug ggu uuu ugu aca aaa aug uga gaa acc uuu gug aga cag aga aca ggg aau uaa aug ugu cau aca uau cca cuu gag ggc gau uug ucu gag agc ugg ggc ugg aug cuu ggg uaa cug ggg cag ggc agg ugg agg gga gac cuc cau uca ggu gga ggu ccc gag ugg gcg ggg cag cga cug gga gau ggg ucg guc acc cag aca gcu cug ugg agg cag ggu cug agc cuu gcc ugg ggc ccc gca cug cau agg gcc guu ugu uug uuu uuu gag aug gag ucu cgc ucu guu gcc uag gcu gga gug cag uga ggc aau cua agg uca cug caa ccu cca ccu ccc ggg uuc aag caa uuc ucc ugc cuc agc cuc ccg auu agc ugg gau cac agg ugu gca cca cca ugc cca gcu aau uau uua uuu cuu uug uau uuu uag uag aga cag ggu uuc acc aug uug gcc agg cug guu ucg aac ucc uga ccu cag gug auc cuc cug ccu cgg ccu ccc aaa gug cug gga uua cag gug uga gcc acc aca ccu gac cca uag guc uuc aau aaa uau uua aug gaa ggu ucc aca agu cac ccu cug auc aac agu acc cgu aug gga caa gcu gca agg uca aga ugg uuc auu aug gcu gug uuc acc aua gca aac ugg aaa caa ucu aga uau cca aca gug agg guu aag caa cau ggu gca ucu gug

FIGURE 18

gau aga acg cca ccc agc cgc ccg gag cag gga cug uca uuc agg gag gcu aag gag aga ggc uug
cuu ggg aua uag aaa gau auc cug aca uug gcc agg cau ggu ggc uca cgc cug uaa ucc ugg cac
uuu ggg agg acg aag cga gug gau cac uga agu cca aga guu uga gac cgg ccu gcg aga cau ggc
aaa acc cug ucu caa aaa aga aag aau gau guc cug aca uga aac agc agg cua caa aac cac ugc aug
cug uga ucc caa uuu ugu guu uuu cuu ucu aua uau gga uua aaa caa aaa ucc uaa agg gaa aua
cgc caa aau guu gac aau gac ugu cuc cag gac aaa gga gag agg ugg gau ugu ggg uga cuu uua
aug ugu aug auu guc ugu auu uua cag aau uuc ugc cau gac ugu gua uuu ugc aug aca cau uuu
aaa aau aau aaa cac uau uuu uag aau

wherein the codon $n_1n_2n_3$ and the codon $n_4n_5n_6$ are both chosen among the group comprising the nucleotide codons which codes for a hydrophobic aminoacid, namely for Alanine (A), Valine (V), Leucine (L), Isoleucine (I), Phenylalanine (F), Methionine (M), Proline (P), Tryptophan (W).

$n_1n_2n_3$ and $n_4n_5n_6$ can be chosen among the group comprising the following nucleotide codons:

- GCU, GCC, GCA, GCG
- GUU, GUC, GUA, GUG,
- UUA, UUG, CUU, CUC, CUA, CUG,
- AUU, AUC, AUA,
- UUU, UUC,
- AUG,
- CCU, CCC, CCA, CCG,
- UGG.

Gene of IL-11 muteins deriving from human IL-11 – SEQ ID NO:76:-

gggaaccctt ggcctgtgg ggacatgaac tgaagttgg ttcatgggaa ggggggggg
gacaggaggag cagggaggag agggaccac ggcggggggtt ggagcagacc ccgctgagtc
gcacagagag ggacccggag acaggcagcc ggggaggaga gcagcttcgg agacaggagg
cggcggagga gatggcaga gagagacaca gacaggagcg gatggaggca gccaatcaga
ggcgcgcag ggggacggg ccagacaggg ccccgagagg gagcagacg cggagacoga
gcagggcag ggacgcaggg actggtgcgg ggagggaggt gaccccatc gaccaggcc
ccaggagcc cgccgggacc gggagactcc ctgggattcc ggcagagagg ctccggaggg
aaactgaggc agggtcgcg gagagcggag caagccaggg agtagcagacc ccagccgggg
ggaggagaga gactggcgc gggggaaag cggggagagc cggcagatg cggccgacgg
aggcgcggac agaccgacgg ctggcggcc cggggggcgg gctgggggtg tgcgaggcgc
ggcggccgg ggagcgtga ttggctggcg gttggccggg tggccgggdc ggcgggggtg
ggctgcggg agcgagctcc ggaccccccgc gccccccgcg cccccccgcg cccccccgc
cagctctcc gctcccggg cccggccgg cccatggctc tgccctctc cggccagggtg
cgctgcggcc cgggttctg cggccaccc ggccgggctc ctgggagggc gtctaagggg
tctccgtgg gagaggtccg tgtctcccg getccgtct ggcttctggc tcctccct
gtctccagcc agctcgggtc cccggggccc ggggaggggg caggttctgg cctgtgcctc
ccccaccatg ccccgccccc gggccagat tccggcgttc gggggcggac gggagacgccc
cgggccgtct acccgccccc ggccgcgtct gctccgacgg gggggcagc cagagccagg
gagggagagg gaagccgcg tggccgtcg acctgcccgc gggcggttcca ccctgggact
taagactcc agtccatcc tccctaaggc cgggagtcga gccccccagac cctccctcccc
gagaccagg agtccagacc ccaggcctc ctccctcaga cctaggagtc caggccccca
gcctctctc ctcagacccc aggaggagtc cagacccca gtcctctcc ctcagaccccg
ggagtccagg cccaggccct cctctctcag accccggagtc cagctgagc tctctgcctt
atccctcccc caggtgtttt cgcctggc ctggcgtgtc tgagctgtg gccagataca
gctgtcggcc ctggggccacc acctggcccc ctcgagttt ccccaagaccc tcggggccgg
ctggacagca cctgtctctt gacccgtct ctccctggcg acacgcggca gctggctgca
cagctgttag gagagactgg gctggggca gcacaggagt gagaggcaga gaggaacgg
gaggagtctg cgggcagcca cttgggggg ttctgggtc tcaggtggca gagtgggaa
gggaaagagt tggggccctg gctgggggg tggaggggagc cccgaggctg ggcaggggcc
acctcacagg ttttttccctt gccagagggg caaattccca gtcgacgggg accacaacct
ggattccctg cccaccctgg ccatgagtgc gggggactg ggagctctac aggtaaaggc
aaggaggtgg gctggggaca aggtggggagg caggcagtg aggggccggg gaggatgagg
ggcactggc ggggtttctc tgatgtccc gctctatccc cagctccctag gttgtctgac
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tggcttccctc ctgaagaccc tggagccca gctggccacc ctgcagggcc gactggacccg
gtctgtcgc cggctgcage tctgtatc tctggccccc aagacctgac accccagacc
cccaccctg gcccccaaat cctgtggctt ggtctttga agcctgagac cccagaccgg
agtgcacag ccccgctctg agaccctgac accctaacag cccgtctga cccctgacca
ccgtaaacagg cccgctctga gaccotgacc ctaacagttc tgctctgaga
gcagtcggaa gatctgtgg ccctgagacc ctgaggccct agaccccaa atccctgcccc
gaaacttcaa attctcaccc aagaccctga gactccatca tccatgaccc
agatcccagg ccctaagacc caagacccca tcctgaagcc caaagccttg
tcctcacctc aagacttggc gaccotggcc ccatgacatt gaaaaccatg
ggcgtgtgg ctcacgcctg taatcccagc actttggag gccgaggcaa
tgaggtcggtt agttcaagac cagccagacc aacatggta aaccctgtct
tacaaaattt gccaggcgtg gtgggtcatg cctgtatcc cagctacttg
gcaggagaat cgcttgaacc tgggaggcgg aggttgcagt gagccgagat
cactccagcc tgggcaacaa gagaaaaact ccctctctt caaaaaaaaa
aaaagaagga aaagaaaacc atggacctcc agaccctgag accccaggcc
gatcctgaca tcttaaagat cccaggccct agatacaag accttgaccc
ttgggaccct ggctgtacaa acccaagacc tccaggaccc
ctatgtctca ctcccaacat cgaaaaaccct gacacctcag atccctgagcc
cgactccaag accctcaatt ccaaagccag gcccaaaagcc
accctggttc ttgggctaa ctcccaagac cctggatctc
gagactccag ccctcacca tgagttctg aacttgaacc
cttcagcctt gagatccagg gcctgaccct agactcgagc
ccacagaccc cagataactgt

FIGURE 19

ctgtaaaacc ccagctctgg tggggagcag tggctcaactc ctgtaatccc aaggcagggg
 aggccaaggc agaaggaccc cttgaggcca ttagttttag acagcctggg cagcatagca
 agactctgtt tcttaattat tattattattt attattttt ggagacagag tctcgcgctc
 tggcccag gctagagtgc aatggtggca ttccggctt ctggaaaccc cgcctctgg
 gctcaagcga ttctcctgcc tcagcctcct gatgttgg gacttcagggt gcacactgcc
 acacccggat aattttttt tatttttagta gacacagggt ttccaccgtgt tgcccaggct
 ggtcacaaac tcctgagctc aggcattccg cccgcctcg cctcccaaag cgctggata
 acaggcgtga tcccgcgcgc ctggcttta aattgttcta acagcagccaa caacaacaaa
 aaccaggcgc tgagattcca gccccggcga ctctaaacgt cccaggcccg atccctcacc
 tagaaccgag atgccagccc tgactccaca gacttcaccc ccaaccccca cactcagctc
 tggaaaggccg tcctgactcc agcctccatt ttccggaaaccc cacagcctga agagctcccg
 gcctaaacac ttcacccac ggcacacagt cccctgtga atatgcagcc cgcattcagc
 tgcagctcca cagcaccctt gcctgcacc cccgctgcac cccctacctg tgactcacct
 ctctcctctc cccacagatg tcccgctgg ccctgcacca gccacccccc gacccggcgg
 cgccccccgt ggccggccccc tcctcagccg cggggggcat cagggccgc cacgcaccc
 tggggggct gnnnnnctgaca cttnnnnnntgg ccgtgagggg actgtgtgtg ctgaagactc
 ggctgtgacc cggggcccaa agccaccacc gccttccaa agccagatct tatttattta
 ttatccatg tactggggc gaaacagccca ggtgatcccc ccgcattat ctccccctag
 ttagagacag tccttcctgt aggcctgggg ggcacatgtg ccttatttat acttatttat
 ttccaggagca ggggtgggg gcaagggtggac tcctgggtcc cccaggaggaa ggggactggg
 gtccggatt cttgggtctc caagaagtgc gtccacacag ttctgcctg gctctccccc
 atctaggcct gggcaggaaac atattattt tatttaagca attactttt atgttggggt
 ggggacggag gggaaaggaa agcctgggtt ttgtacaaa aatgtgagaa accttggta
 gacagagaac agggaaattaa atgtgtcata catatccact tgaggccgt ttgtctgaga
 gctggggctg gatgctggg taactggggc agggcagggt gaggggagac ctccattcag
 gtggagggtcc cgagtggcg ggcagcgcac tgggagatgg gtcggtcacc cagacagctc
 tggggggca ggggtctgac ctggctggg gccccgcact gcatagggccc gtttgggt
 tttttagat ggagtctcgc tctgttgccct aggctggagt gcaagtggggc aatataagg
 cactgcaacc tccacccccc gggttcaagc aattcttctg ctcagccctc ccgatttagct
 gggatcacag gtgtcacca ccatgccccag ctaattattt atttctttt tatttttagt
 agagacaggg ttccacatg ttggccaggc tggttcgaa ctccgtaccc caggtgatcc
 tcctgcctcg gcctccaaa gtgctggat tacagggtg agccaccaca cctgaccat
 aggtctcaa taaatattt atggaaaggat ccacaagtca ccctgtgatc aacagtaccc
 gtatgggaca aagctgcaag gtcaagatgg ttcttattgg ctgtgttccat catagcaaac
 tggaaacaat ctatgatatcc aacagtgggg gttaaagcaac atgggtcattc tggataga
 acgccaccca gcccgggaa gcaggactg tcattcaggg aggctaaaggaa gagaggctt
 ctggggatat agaaagatat cctgacattt gcccaggcatg gtggctcaacg cctgtatcc
 tggcactttt ggaggacgaa gcgagggtt cactgaagtc caagagttt agacccggcct
 gcgagacatg gcaaaaccct gtcctaaaaa agaaagaatg atgtccctgac atgaaacagc
 aggctacaaa accactgcat gctgtgatcc caattttgtt ttttcttcc tatatatgg
 taaaaacaaa aatcctaaag gaaatacgc caaaatgtt acaatgactg tctccaggc
 aaaggagaga ggtgggattt tgggtgactt ttaatgttta tgattgtctg tattttacag
 aatttctgcc atgactgtgtt attttgcattt acacattttt aaaaataataa acactatttt
 tagat

wherein the codon $n_1n_2n_3$ and the codon $n_4n_5n_6$ are as defined in Figure 16A.

FIGURE 19

**Radioprotection of mice treated by FPΔII-1
after irradiation at 15 Gy**

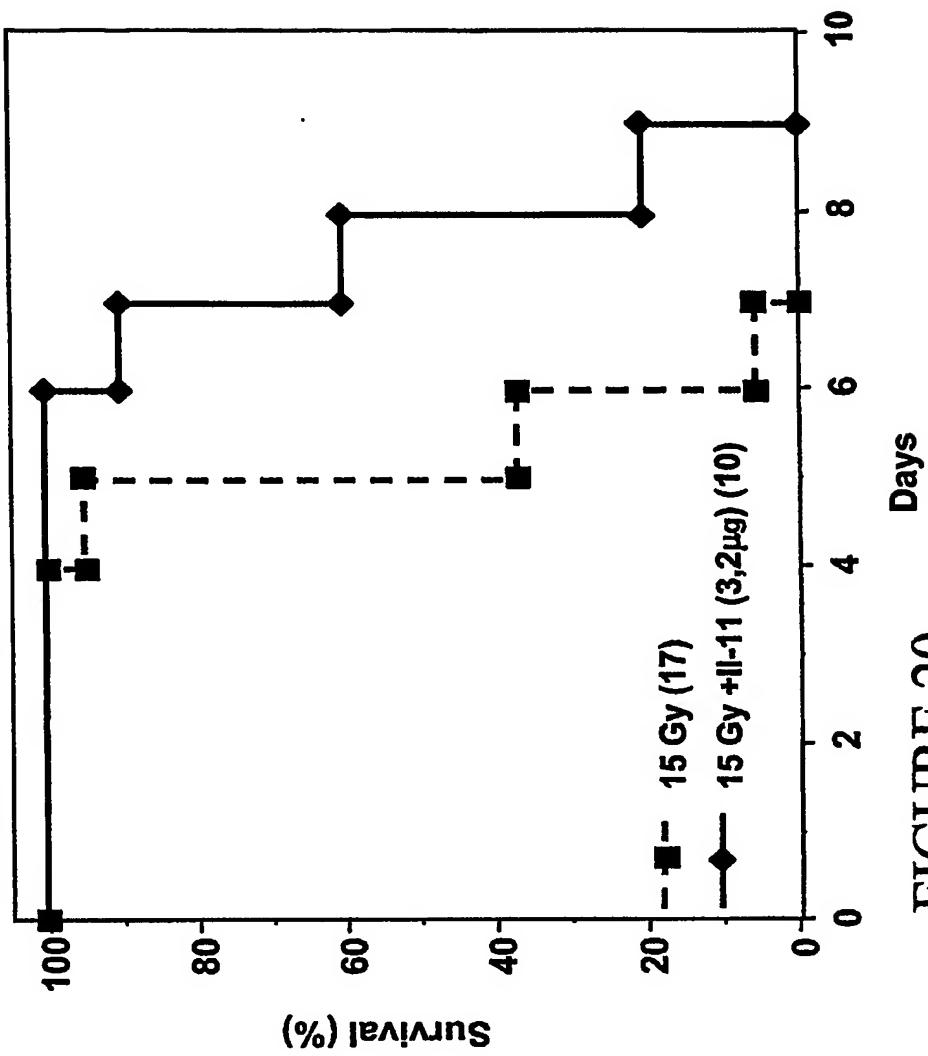
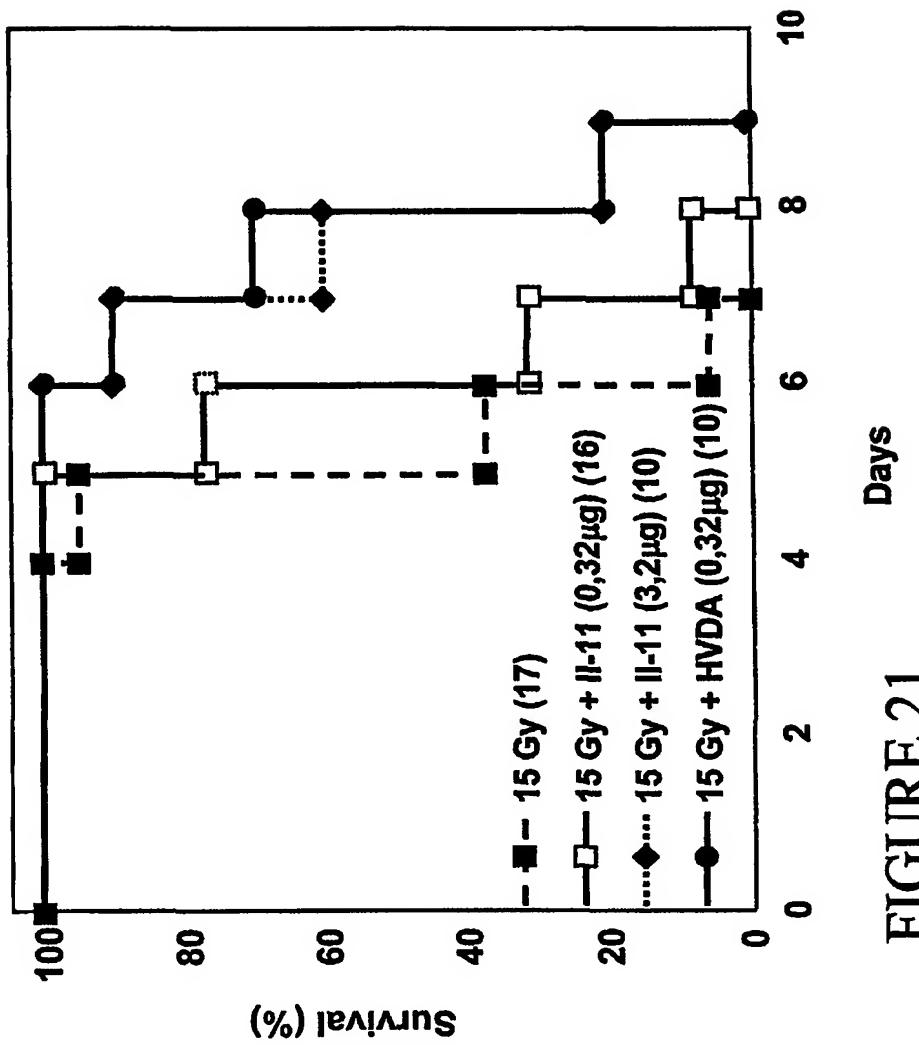


FIGURE 20

Low doses of FPA Δ II-11 munein delay the death mice irradiated at 15 Gy



Parental (non-mutated) nucleotide sequence FPA1L-11 = SEQ ID NO:77 =

ATG GAC TAC AAG GAT GAC GAT GAC AAG GAA GGT CGT CGT GCA TCT
GTT GCA TCC CCA GAC CCT CGG GCC GAG CTG GAC AGC ACC GTG CTC
CTG ACC CGC TCT CTC CTG GCG GAC ACG CGG CAG CTG GCT GCA CAG
CTG AGG GAC AAA TTC CCA GCT GAC GGG GAC CAC AAC CTG GAT TCC
CTG CCC ACC CTG GCC ATG AGT GCG GGG GCA CTG GGA GCT CTA CAG
CTC CCA GGT GTG CTG ACA AGG CTG CGA GCG GAC CTA CTG TCC TAC
CTG CGG CAC GTG CAG TGG CTG CGC CGG GCA GGT GGC TCT TCC CTG
AAG ACC CTG GAG CCC GAG CTG GGC ACC CTG CAG GCC CGA CTG GAC
CGG CTG CTG CGC CGG CTG CAG CTC CTG ATG TCC CGC CTG GCC CTG
CCC CAG CCA CCC CCG GAC CCG CCG GCG CCC CCG CTG GCG CCC CCC
TCC TCA GCC TGG GGG GGC ATC AGG GCC GCC CAC GCC ATC CTG GGG
GGG CTG CAC CTG ACA CTT GAC TGG GCC GTG AGG GGA CTG CTG CTG
CTG AAG ACT CGG CTG TGA

Parental (non-mutated) amino acid sequence of FPA1L-11 = SEQ ID NO:78 =

MDYKDDDDKEGRRASVASPDPRRAELDSTVLLTRSLLADTRQLAAQLRDKFPA
DGDHNLDLDSLPTLAMSAGALGALQLPGVLTRLRADLLSYLRHVQWLRRAGGSS
LKTLEPELGTQARLDRLRRQLLMSRLALPQPPPDPPAPPLAPPSSAWGGIRA
AHAILGGLHLTLDWAVRGLLLLKTRL

Mutated nucleotide sequence of FPA1L-11 = SEQ ID NO:79 of the invention =

ATG **GAC TAC AAG GAT GAC GAT GAC AAG** GAA GGT **CGT CGT GCA TCT**
GTT GCA TCC CCA GAC CCT CGG GCC GAG CTG GAC AGC ACC GTG CTC
CTG ACC CGC TCT CTC CTG GCG GAC ACG CGG CAG CTG GCT GCA CAG
CTG AGG GAC AAA TTC CCA GCT GAC GGG GAC CAC AAC CTG GAT TCC
CTG CCC ACC CTG GCC ATG AGT GCG GGG GCA CTG GGA GCT CTA CAG
CTC CCA GGT GTG CTG ACA AGG CTG CGA GCG GAC CTA CTG TCC TAC
CTG CGG CAC GTG CAG TGG CTG CGC CGG GCA GGT GGC TCT TCC CTG
AAG ACC CTG GAG CCC GAG CTG GGC ACC CTG CAG GCC CGA CTG GAC
CGG CTG CTG CGC CGG CTG CAG CTC CTG ATG TCC CGC CTG GCC CTG
CCC CAG CCA CCC CCG GAC CCG CCG GCG CCC CCG CTG GCG CCC CCC
TCC TCA GCC TGG GGG GGC ATC AGG GCC GCC CAC GCC ATC CTG GGG
GGG CTG **GTT** CTG ACA CTT **GCC** TGG GCC GTG AGG GGA CTG CTG CTG
CTG AAG ACT CGG CTG TGA

Mutated amino acid sequence of FPA1L-11 = SEQ ID NO:80 of the invention =

M**DYKDDDDK****EGR****RASV****ASPD****PRAELD****STVLL****TRSLL****ADTRQLAA****QLRDKFPA**
DGDHNLDLDSLPTLAMSAGALGALQLPGVLTRLRADLLSYLRHVQWLRRAGGSS
LKTEPELGTQARLDRLRLQLLMSRLALPQPPPDPAPPAPLAPPSSAWGGIRA
AHAILGGLVLTAWAVRGLLLKTRL

FIGURE 23

Primers used for inverse PCR mutagenesis of FPΔIL-11:

Muteins	Primers
H182/V	G422 pACACTT G ACTGGGCCGTACGGGGAC (s) SEQ ID NO:81 G412 pCAGAACCAGCCCCCCCAGGATGG (as) SEQ ID NO:82
D186/V	G410 pACACTT G TCTGGGCCGTACGGGGAC (s) SEQ ID NO:83 G421 pCAGGTGCAGCCCCCCCAGGATGG (as) SEQ ID NO:84
D186/A	G411 pACACTT G CCTGGGCCGTACGGGGAC (s) SEQ ID NO:85 G421 pCAGGTGCAGCCCCCCCAGGATGG (as) SEQ ID NO:86
H182/V- D186/V	G410 pACACTT G TCTGGGCCGTACGGGGAC (s) SEQ ID NO:87 G412 pCAGAACCAGCCCCCCCAGGATGG (as) SEQ ID NO:88
H182/V- D186/A	G411 pACACTT G CCTGGGCCGTACGGGGAC (s) SEQ ID NO:89 G412 pCAGAACCAGCCCCCCCAGGATGG (as) SEQ ID NO:90

FIGURE 24

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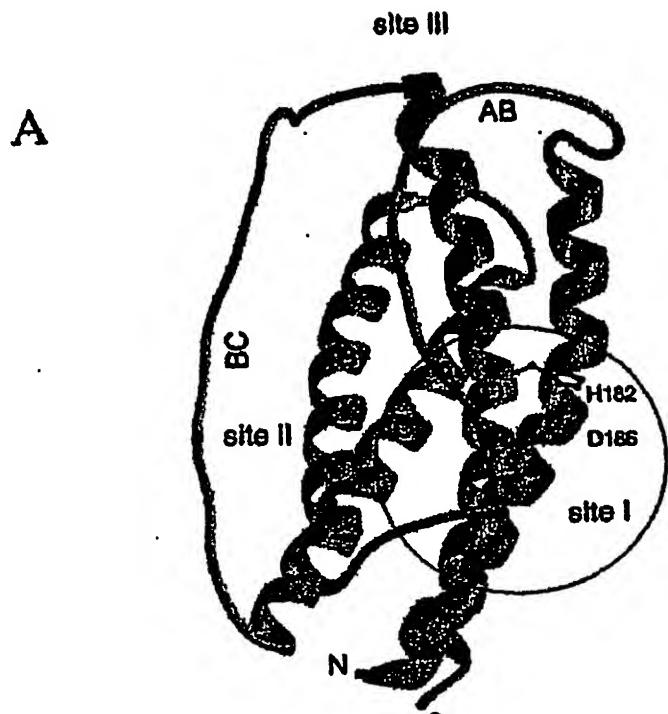


Figure 25A



Figure 25B

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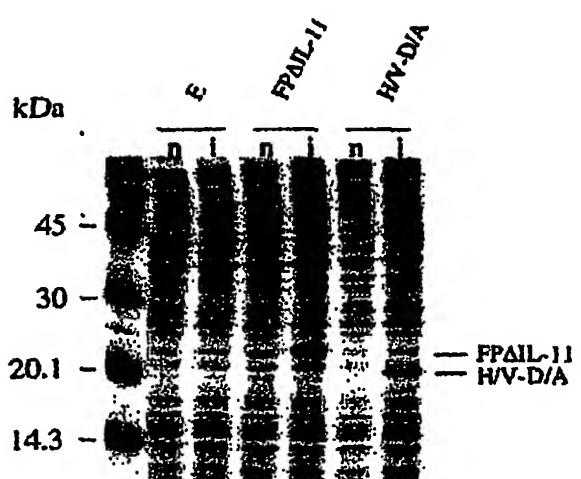


Figure 26

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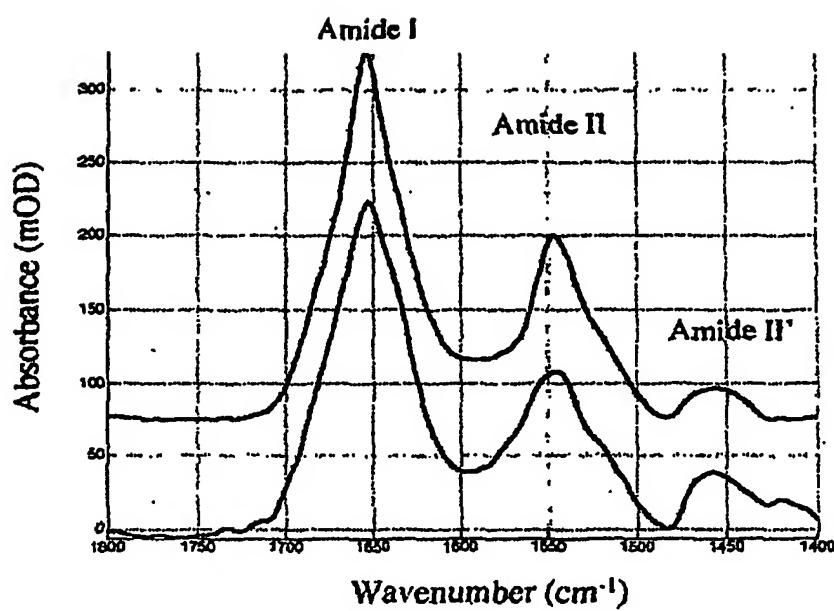


Figure 27

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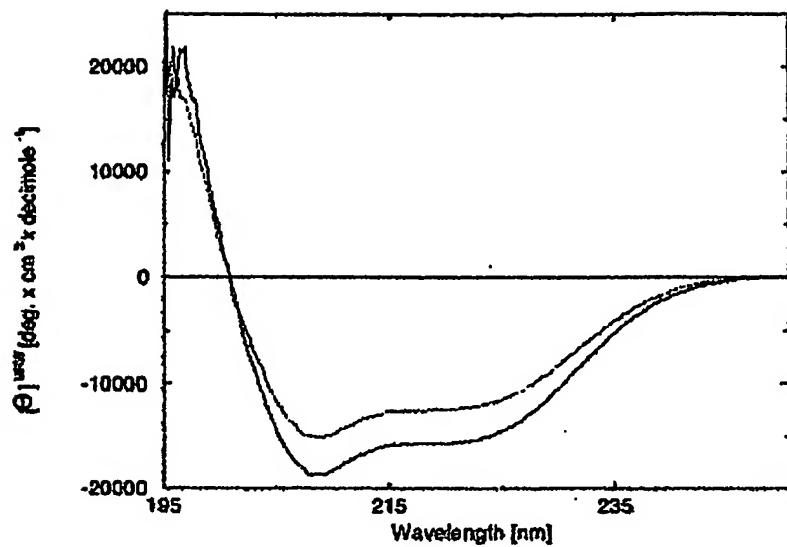


Figure 28

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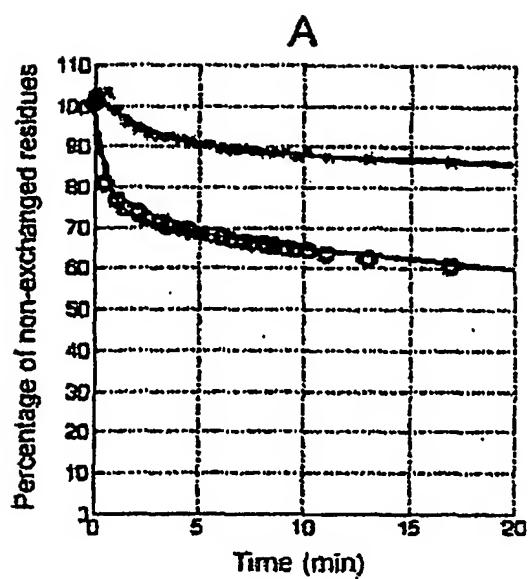


Figure 29A

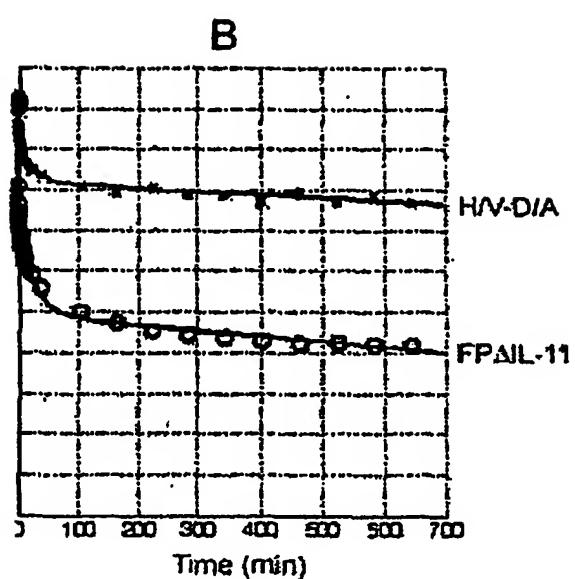


Figure 29B

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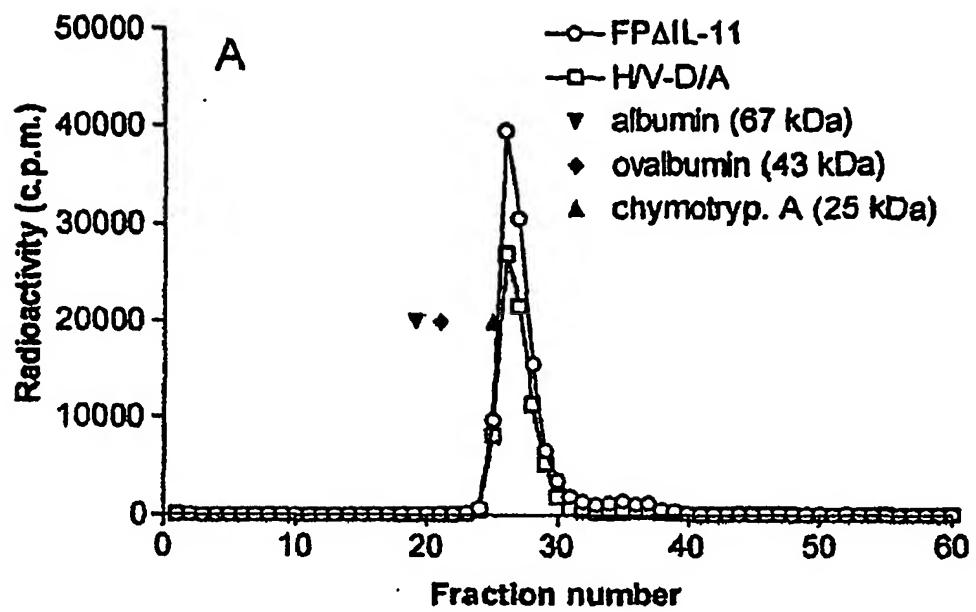


Figure 30A

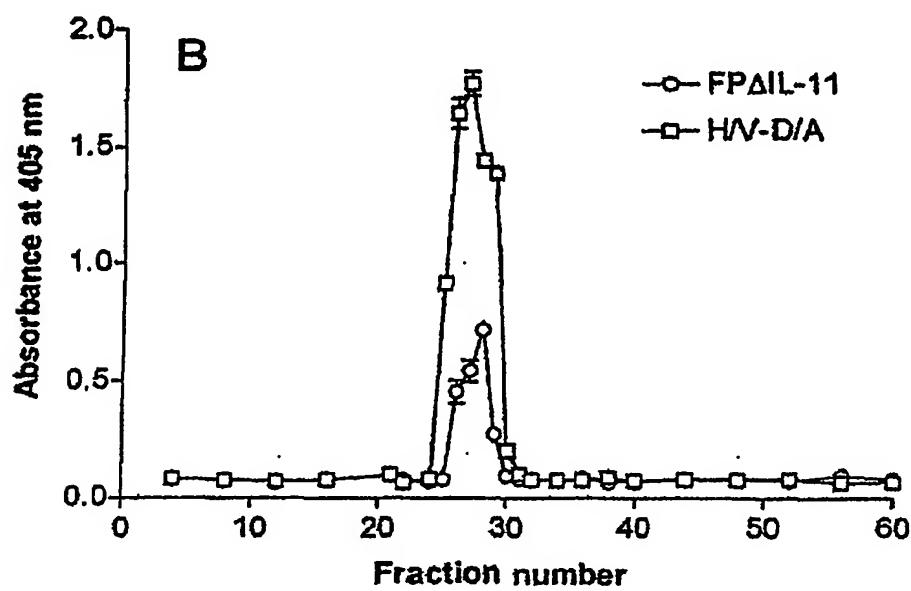


Figure 30B

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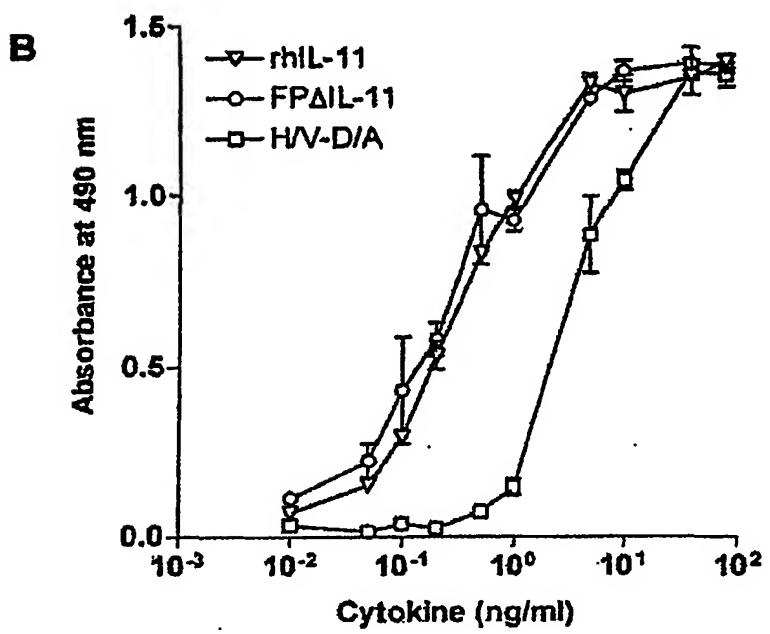
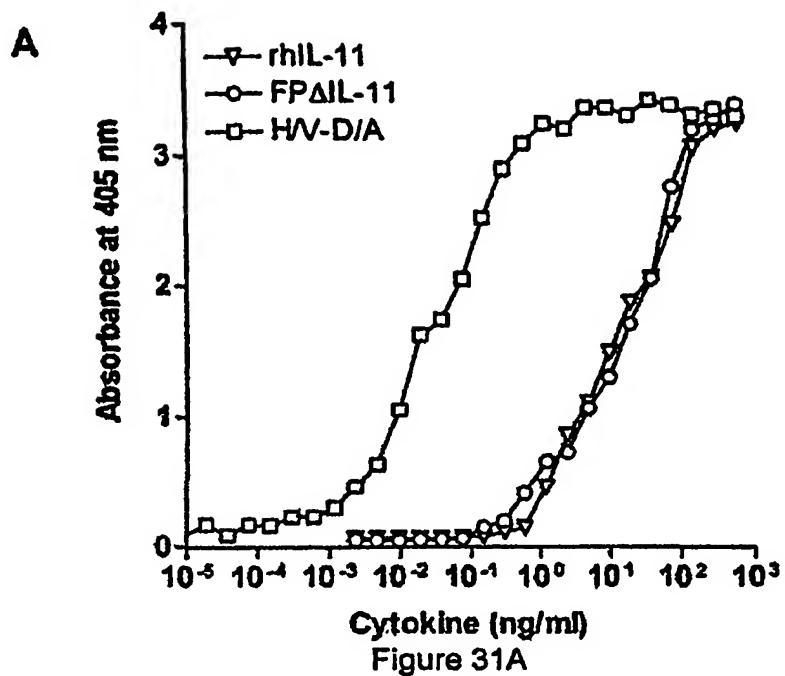


Figure 31B

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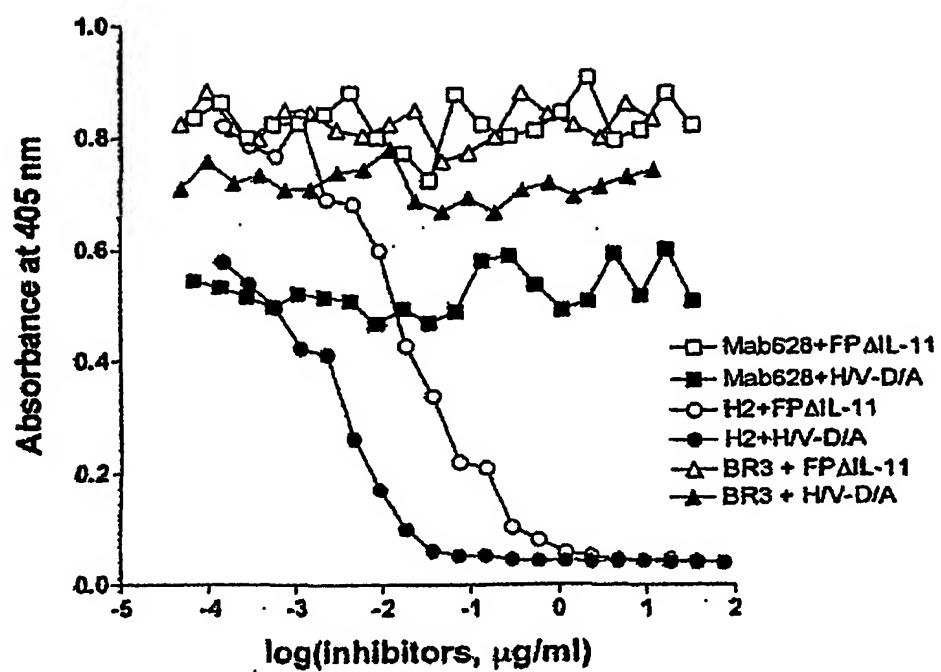


Figure 32

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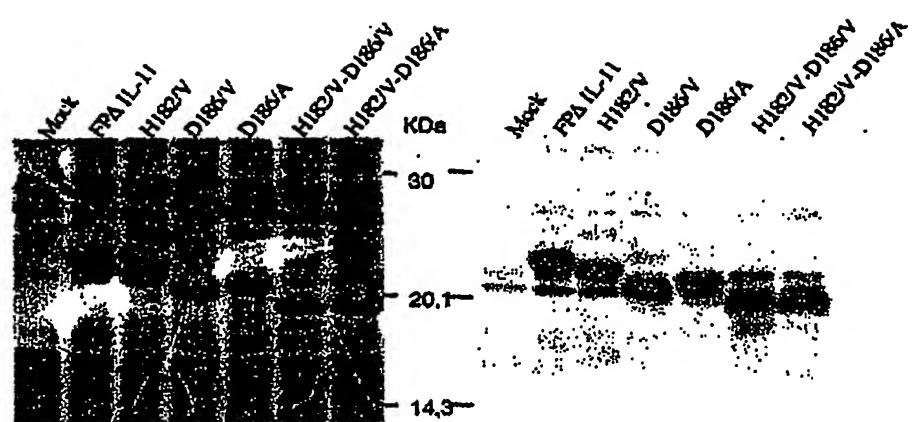


Figure 33

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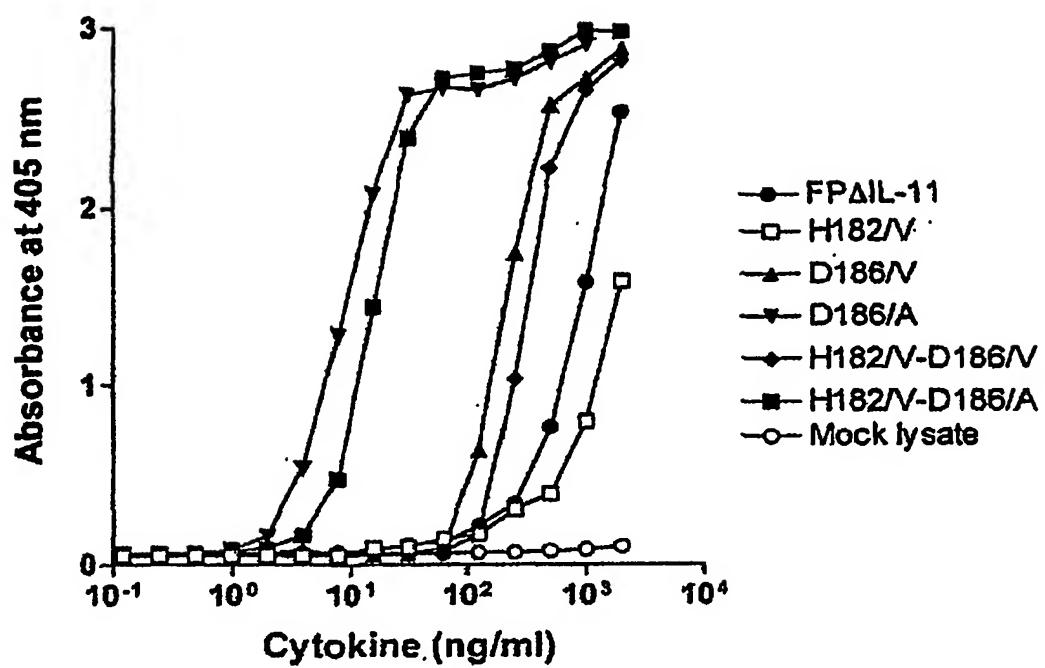


Figure 34

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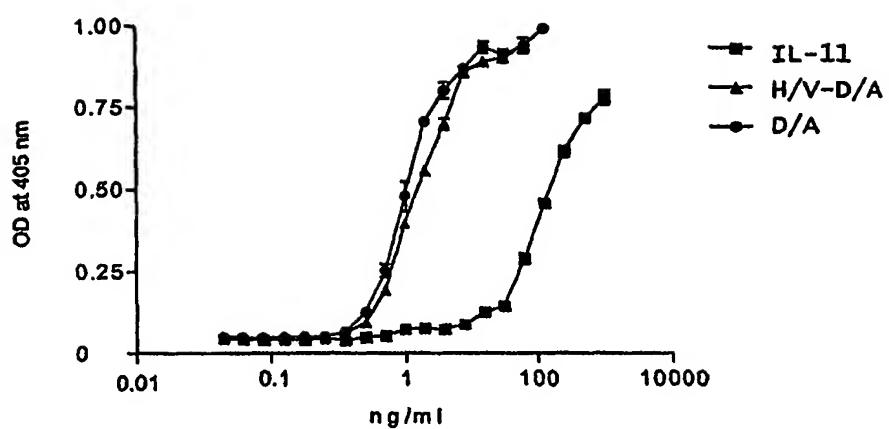


FIGURE 35

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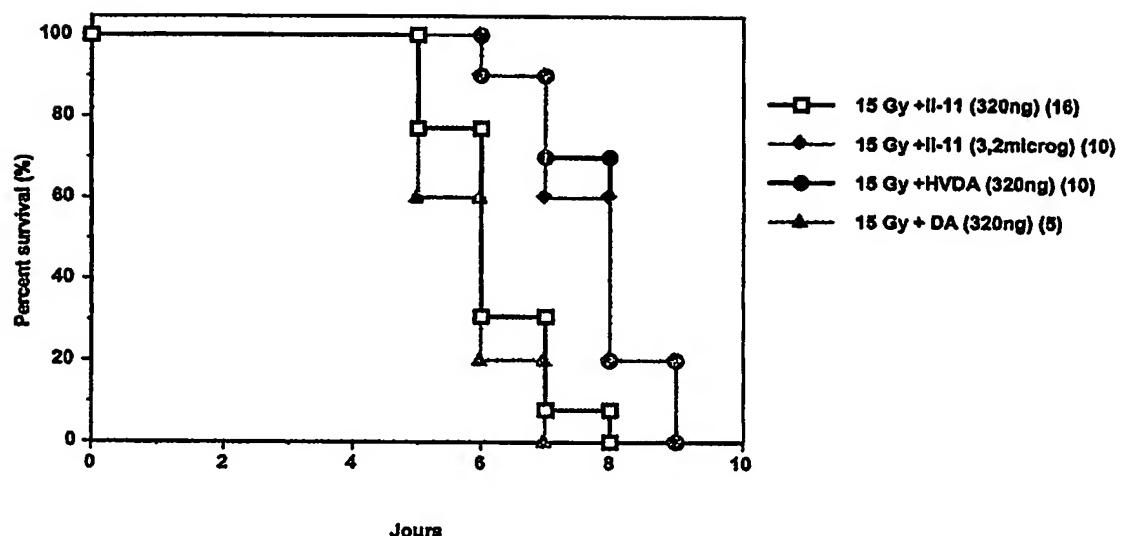


FIGURE 36